

Bally

October 1992
16-20006-101



Operations Manual Includes

Operations & Adjustments
Testing & Problem Diagnosis
Parts Information
Reference Diagrams & Schematics

Midway Manufacturing Company
3401 North California Avenue
Chicago, Illinois 60618

Jumper Charts **Display**

	W1	W2
1MEG, 2MEG, 4 MEG EPROM	In	Out
512K, 1 MEG EPROM	Out	In

Country	W14	W15	W16	W17	W18
America	In	In	In	In	In
European	In	In	Out	In	In
French	In	In	In	Out	In
German	In	In	In	In	Out

Solenoid/Flasher Table

Sol. No.	Function	Solenoid Type and Voltage Connector		Driver Transistor, Connection, and Wire Color				Solenoid Part Number Flashlamp Type
01	Trap Door	High Power	J107-3	Q82	J130-1		Vio-Brn	AE-26-1500
02	Shooter	High Power	J107-2	Q80	J130-2		Vio-Red	AE-26-1200
03	Oplo Popper	High Power	J107-3	Q78	J130-4		Vio-Orn	AE-23-800
04	Mini Left Opto Eject	High Power	J107-2	Q76	J130-5		Vio-Yel	AE-26-1500
05	Mini Right Opto Eject	High Power	J107-2	Q64	J130-6		Vio-Gm	AE-26-1500
06	2nd Chance Logo, Flasher	High Power	J107-5	Q66	J130-7	J131-3	Vio-Blu	#906
07	Knocker	High Power	J107-3	Q68	J130-8		Vio-Blk	AE-23-800
08	Doctor 3	High Power	J107-5	Q70		J131-5	Vio-Gry	#906
09	Left Sling	Low Power	J107-2	Q58	J127-1		Brn-Blk	AE-26-1500
10	Right Sling	Low Power	J107-2	Q56	J127-3		Brn-Red	AE-26-1500
11	Left Jet	Low Power	J107-2	Q54	J127-4		Brn-Org	AE-26-1200
12	Right Jet	Low Power	J107-2	Q52	J127-5		Brn-Yel	AE-26-1200
13	Bottom Jet	Low Power	J107-2	Q50	J127-6		Brn-Grn	AE-26-1200
14	Backbox Head, Flasher	Low Power	J107-6	Q48		J128-2	Brn-Blu	#906
15	Outhole	Low Power	J107-2	Q46	J127-8		Brn-Vlo	AE-27-1200
16	Trough	Low Power	J107-2	Q44	J127-9		Brn-Gry	AE-26-1200
17	Mini-playfield/Doctor 7, Flasher	Flasher	J107-5,6	Q42	J126-1	J125-1	Blk-Brn	#906
18	5 x 3 Left/Left, Flasher	Flasher	J107-5	Q40	J126-2	J125-2	Blk-Red	#906
19	5 x 3 Right/Right, Flasher	Flasher	J107-5	Q38	J126-3	J125-3	Blk-Org	#906
20	Jet Bumpers/Doctor 5, Flasher	Flasher	J107-5,6	Q36	J126-4	J125-5	Blk-Yel	#906
21	REPAIR/Doctor 4, Flasher	Flasher	J107-5,6	Q28	J126-5	J125-6	Blu-Gm	#906
22	W-(H)-Q/Doctor 2, Flasher	Flasher	J107-5	Q30	J126-6	J125-7	Blu-Blk	#906
23	W-H-(Q)/Doctor 6, Flasher	Low Power	J107-5	Q34	J126-7	J125-8	Blu-Vlo	#906
24	ESCAPE/Doctor 1, Flasher	Low Power	J107-5	Q32	J126-8	J125-9	Blu-Gry	#89
25	Not Used	Flasher		Q26			Blu-Brn	
26	Not Used	Flasher		Q24			Blu-Red	
27	Mini-playfield C.C.W./C.W.	Flasher	J107-6	Q22	J122-3		Blu-Org	A-15680
28	Mini-playfield On/Off	Flasher	J107-6	Q20	J122-4		Blu-Yel	A-15680
G. I. Circuits								
01	Insert 1	G.I.		Q18	J121-1		Brown	#555
02	Insert 2	G.I.		Q10	J121-2		Orange	#555
03	Playfield A/Insert A	G.I.		Q14	J120-3	J121-3	Yellow	#44, #555
04	Playfield B/Insert B	G.I.		Q16	J120-5	J121-5	Green	#44, #555
05	Playfield C/Insert C	G.I.		Q12	J120-6	J121-6	Violet	#44, #555
	Upper Left Flipper		J907-8,9	Q1, Q5	J902-1, 3		Gry-Yel	FL-15411 (ORG)
	Lower Left Flipper		J907-4,5	Q3, Q9	J902-7, 9		Gry-Yel	FL-15411 (ORG)
	Lower Right Flipper		J907-1,2	Q4, Q11	J902-11,12		Blu-Yel	FL-15411 (ORG)

J1XX = Power Driver Board, J9XX = Fliptronic II Board

Midway Manufacturing Company reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

DOCTOR WHO



Movement of the mini-playfield can cause **SERIOUS PHYSICAL INJURY**. Keep fingers and loose clothing away from **ALL** moving parts.

As a **safety feature**, during normal game play (and attract mode) the mini-playfield will not move unless the coin door is closed and the playfield glass is on. During the mini-playfield test, both flipper buttons must be pressed before it will move.



Durch die Bewegungen der **MINI-SPIELFLÄCHE** können **ERNSTHAFTE VERLETZUNGEN** verursacht werden! **FINGER WEG** und **LOSE KLEIDUNG FERNHALTEN!**

Zur Sicherheit ist die **MINI-SPIELFLÄCHE** während des Normalspiels und im Attract Modus stillgelegt und bewegt sich nicht, solange die Münzprüfer-Tür geöffnet und die Spielflächenscheibe abgezogen ist.

Im Test-Modus bewegt sich die **MINI-SPIELFLÄCHE** nur, wenn vorher **BEIDE** Flippertasten gedrückt wurden.



Le mouvement du mini-plateau peut provoquer de **sérieuses BLESSURES CORPORELLES**. **Gardez vos doigts et vêtements loin de toute pièce mobile.**

Pendant le jeu normal et le mode d'attraction, **pour des raisons de sécurité**, le mini-plateau ne pourra se mettre en mouvement si la porte de l'appareil est ouverte et si la glace principale n'est pas à sa place. Ne jamais court-circuiter le contact de fermeture de la glace.

Pendant le test du mini-plateau, les deux boutons des flippers doivent être maintenus fermés afin que ce dispositif se mette en mouvement.

Table of Contents

Game Rules & Playfield Shots.....	A-N
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Section 1 - Game Operation & Test Information

(System WPC) ROM Summary	1-1
Pinball Game Assembly Instructions	1-2
Pinball Assembly, Playfield Pitch Angle and Leg Levelers Detail	
Game Control Locations	1-4
Game Operation	1-5
Game Check-out	1-6
Menu System Operation	1-9
Bookkeeping Menu	1-10
B.1 Main Audits & B.2 Earnings Audits	1-10
B.3 Standard Audits & B.4 Feature Audits	1-11
B.5 Histograms & B.6 Time-Stamps	1-13
Printouts Menu	1-14
Test Menu	1-15
T.1 Switch Edges & T.2 Switch Levels	1-15
T.3 Single Switch, T.4 Solenoid, & T.5 Flasher Tests	1-16
T.6 G.I., T.7 Sound and Music, T.8 Single Lamp, T.9 All Lamps,	
T.10 Lamp and Flasher Tests	1-17
T.11 Display & T.12 Flipper Coil Tests	1-18
T.13 Trap Door Test	1-19
T.14 Mini-playfield Test	1-20
Utilities Menu	1-22
U.1 Clear Audits, U.2 Clear Coins, U.3 Reset H.S.T.D.,	
U.4 Set Time & Date, & U.5 Custom Message	1-22
U.6 Set Game I.D., U.7 Factory Adjustments, U.8 Factory Reset,	
& U.9 Presets	1-23
Game Difficulty Table for U.S./Canada/France	1-24
Game Difficulty Table for Germany/Europe	1-25
Preset Table U.S./Canada	1-26
Preset Table Germany/Europe, and France	1-28
U.10 Clear Credits & U.11 Auto Burn-In	1-29
Adjustment Menu	1-30
A.1 Standard Adjustments	1-30
A.2 Feature Adjustments	1-34
A.3 Pricing Adjustments	1-40
Pricing Table	1-42
A.4 H.S.T.D. Adjustments	1-43
A.5 Printer Adjustments	1-44
Error Messages	1-45
CPU Board, Sound Board Error Codes & Opto Theory	1-47
LED List	1-48
Fuse List	1-49
Maintenance Information	1-50
Playfield Adjustments	1-51
Mini-Playfield Service Instructions	1-52
Notes	1-54

Section 2 - Game Parts Information

Line Filter/Cordset Chart	2-2
Cabinet Parts	2-3
Backbox Assembly	2-4
Fliptronic II Board	2-5
Audio Board	2-6
CPU Board	2-8
Power Driver Board	2-10
Dot Matrix Controller Board	2-12

Bi-directional Motor Drive Board.....	2-14
10-Switch Opto Board	2-15
Coin Door Interface Board.....	2-16
2-10W Resistor Board, & Flipper Opto Board.....	2-17
Fliptronic II Flipper Assembly	2-18
Outhole Kicker Assembly.....	2-20
Ball Shooter Lane Feeder Assembly.....	2-21
Kicker Arm (Slingshot) Assembly.....	2-22
Jet Bumper & Coil Assembly	2-23
Ball Trough Switches & Kicker Assembly	2-24
Tardis Box Assembly & Kicker Bracket Assembly.....	2-25
Mini-Playfield Assembly	2-26
Ball Popper Assembly.....	2-28
Motor & Cam Assembly.....	2-29
Mini-Playfield Main and Support Bracket Assembly	2-30
Mini-Playfield Cover Assembly.....	2-31
3-Door Assembly.....	2-32
Dalek Assembly.....	2-33
Trap Door, Cam and Plunger, & Gate Assemblies.....	2-34
Cap Ball Popper Assembly	2-35
Target Assemblies.....	2-36
Posts.....	2-37
Coin Door Assembly.....	2-38
Cable List, & Back Panel Assembly	2-40
Unique Parts List.....	2-41
Upper Playfield Parts List	2-42
Upper Playfield Parts Locations	2-43
Lower Playfield Parts Locations.....	2-44
Lamp Locations.....	2-45
Switch Locations.....	2-46
Solenoid/Flasher Locations	2-47
Rubber Parts Locations	2-48
Ramp Locations	2-49
Notes	2-50

Section 3 - Wiring Diagrams and Schematics

Component Identification.....	3-1
Lamp Matrix & Circuit Drawing.....	3-2
Switch Matrix & Circuit Drawings.....	3-3
Solenoid/Flasher Table & Circuit Drawings	3-5
Solenoid Wiring.....	3-8
Flipper Opto Switch Board Wiring/Schematic.....	3-9
Flipper Circuit Diagrams.....	3-10
Opto Switch 10 PCB Wiring.....	3-12
Opto Switch 10 PCB Schematic	3-13
Bi-directional Motor Drive PCB & Schematic	3-14
Mini-playfield Wiring Block Diagram	3-15
2-10W Res PCB, & 4 Lamp G.I. Board Wiring/Schematics.....	3-16
Speaker Wiring.....	3-17
Coin Door Interface Board Schematic.....	3-18
Coin Door Interface Board Wiring	3-19
Power Driver Board Wiring.....	3-20
CPU Board Wiring.....	3-23
Audio Board Wiring.....	3-24
Dot Matrix Controller Board Wiring.....	3-25
Fliptronic II Board Wiring.....	3-26

DOCTOR WHO PINBALL:

TIME STREAMS

GAME STORY

Time is running out, literally.....

The Master is back and this time he will not fail! He has recruited Davros and what is left of his desperate Daleks. Since being beaten by the Movellans, this group of Daleks have nothing to lose. And both have one enemy in common...the Doctor!

The Master has found an ancient Gallifrey Laboratory equipped with an everlasting self-regenerating "Time Expander". This "Time Expander" can take any part of time and space, stretch it, then allow all other space and time events to interact with this new time stream. This machine requires two operators to work together (changing time and space is serious business). Of course, this has never stopped the Master, or even Davros.

The problem of finding all seven Doctors and expanding their time streams is easily solved in one word--Earth! This is the Doctor's favorite planet. All of his regenerations past, present, and even future, have or will, arrive upon Earth. All that has to be done is to expand Earth's time and push all the Doctors into the final nova of the Earth's Sun. At game start, you can experience the time expansion of Earth by observing the continental drift back to the past (over 300 million years ago!).

But everything has not gone as planned. All of the Doctors, aware of time being expanded, have escaped. However, not everyone is safe. The first Doctor has escaped to a planet and is being bombarded by the Master's "borrowed and enhanced" Roni spheres. The second Doctor is lost in a land mine of black holes in space and is trying to dodge destruction (the black holes are rumored to power the Time Expander). The third Doctor is trapped in the Whomobile. The fourth Doctor is stranded somewhere to repair his TARDIS from old unreliable force field projectors. The fifth Doctor, transmatted away from Earth is, unfortunately, held prisoner in a never ending transmat web. The sixth Doctor was jettisoned to a mountainous Dalek planet, where the time expanded rebirth of the Dalek race is about to begin. Last but not least, the seventh Doctor is much more fortunate. He escaped unharmed and has found the Time Expander. Now the challenge is to restore Earth's Time to normal, confront the Master and his traps, the Daleks, and of course Davros (the creator of the Daleks).

When it is time for the ultimate battle with Davros, all the Doctors will be re-united, combining their unique knowledge and experience to defeat Davros and his Daleks.

BACKGROUND

The first episode was broadcast on November 23, 1963.

The shows Thirtieth Anniversary will be celebrated in 1993 (twenty-six seasons broadcasted to date).

Doctor Who is the longest running Science Fiction Show.

There have been a total of seven Doctors. He has 13 "regenerations" possible. Listed below are the actors and their air dates.

- 1) William Hartnell • 1963-1966, four seasons.
- 2) Patrick Troughton • 1966-1969, two seasons.
- 3) Jon Pertwee • 1970-1974, five seasons.
- 4) Tom Baker • 1975-1981, seven seasons.
- 5) Peter Davison • 1982-1984, three seasons.
- 6) Colin Baker • 1984-1986, two seasons.
- 7) Sylvester McCoy • 1987-1989, three seasons.

The "Time Streams" theme is not patterned after a particular episode.

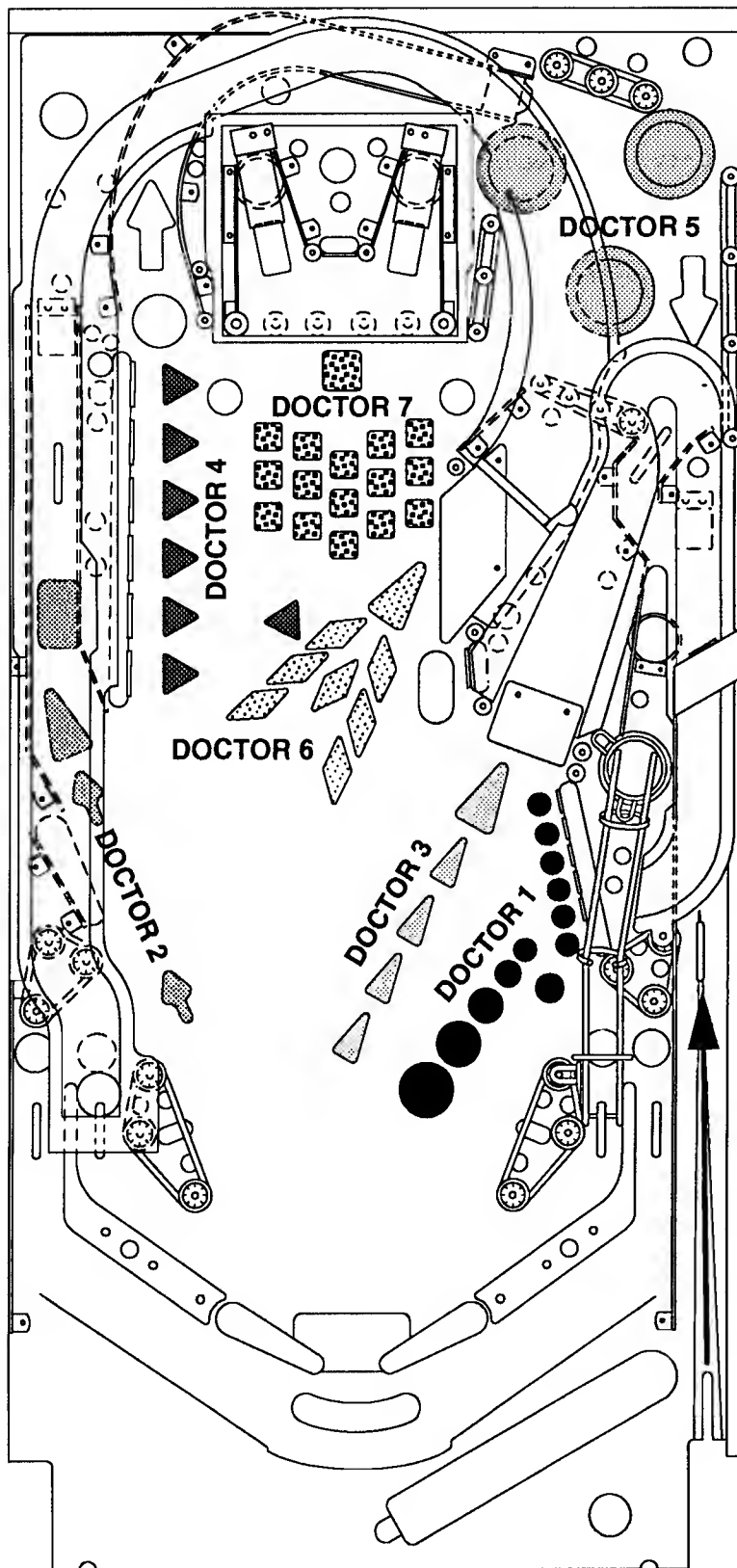
The "Time Expander" is a new feature of pinball, and for Doctor Who fans.

TERMINOLOGY

Doctor Who	A Time Lord, who has taken a TARDIS and travels through time and space.
TARDIS	A time machine that the Doctor uses. TARDIS is an acronym for "Time And Relative Dimensions In Space", and is bigger on the inside than the outside. The Doctors' TARDIS is "stuck" in the shape of a police box (the chameleon circuit does not work properly). The "Master" also has a TARDIS, usually in the shape of a Roman Pillar, but his chameleon circuit is fully functional.
Time Lord	The race of the Doctor.
Gallifrey	The home planet of the Doctor.
Dalek	A being intentionally mutated by radiation in a protected shell that is impervious to most weapons.
Davros	The creator of the Daleks. Defeated many times by the Doctor.
The Master	A renegade Time Lord, also defeated by the Doctor.
Transmat	A matter-transmitter that can transport people or objects from one place to another.
Time Expander	A machine to stretch time within a certain area of time and space.
Rassilon	A historical Time Lord who created time travel for the Time Lords.

RULES

- Ball Start:** Use flippers to select one of the seven Doctor's areas, then shoot the ball. The area selected will have increased scoring potential.
- Transmat:** Lite extra Doctors by building the Transmat Power (jet bumpers), then hit the flashing "Activate Transmat" target.
- Multiball:** Earn locks by hitting center target of Time Expander, lock 2 balls, then restore Earth time to factor 0 by lighting all 15 control panel lamps. Then, shoot the ball into any door.
- Jackpot:** During Multiball, time warp Daleks by going into each door. When Davros Super Jackpot appears, deactivate force field by hitting the 5 targets, then time warp him.
- Playfield Multiplier:** Build from cliffhanger (top) ramp, it multiplies ALL scores and builds loop champion.
- Sonic Boom:** Scores 10 Million points each for spelling W-H-O every 10th loop.
- Unlimited Million:** After playfield multiplier 4X.
- Repair Millions:** Complete R-E-P-A-I-R within the allowed time and any REPAIR target is worth 1 Million points.
- Lighting Extra Ball:** Complete W-H-O sequence a set amount of times (see status report).
- Video Mode:** Relit by spelling ESCAPE. Use 1 flipper to jump over small obstacles, 2 flippers for large obstacles. Extra Ball awarded during wave three (auto adjustable).
- Special:** Complete E-S-C-A-P-E until "S" lamp is ON.



At ball start use your flippers (right flipper increases the Doctor number, left flipper decreases the Doctor number) to choose an area of the playfield (Doctor's 1 thru 7), then launch the ball. The doctor's area selected will have increased scoring potential.

Doctor 1: Spots an extra ESCAPE target for a faster way to the SPECIAL.

Doctor 2: Doubles the score and allows for more time between shots.

Doctor 3: Doubles the score and allows for more time between shots for an easier way to get extra balls.

Doctor 4: Allows for more REPAIR time between shots.

Doctor 5: Makes the transmat bonus grow faster, allowing more Doctor's to be lit.

Doctor 6: Increases the playfield multiplier by 2 steps instead of 1, and allows for more time to score at the current playfield multiplier.

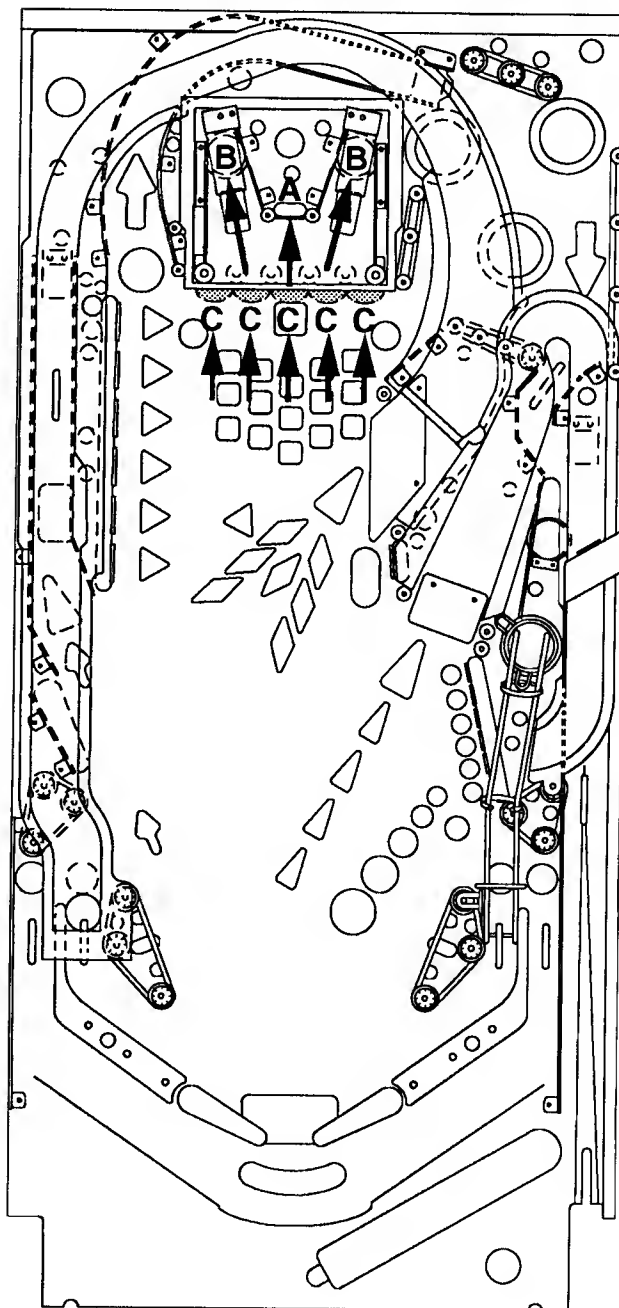
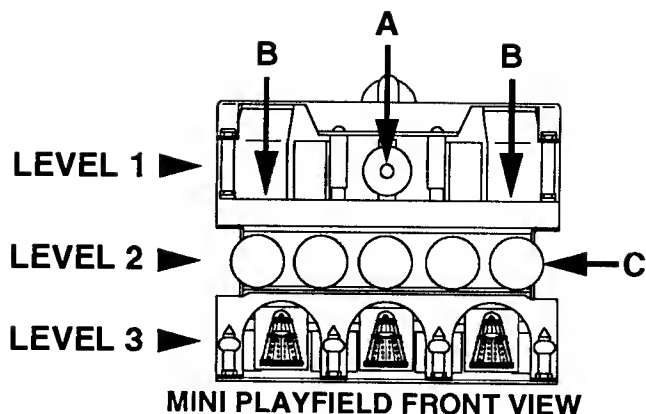
Doctor 7: Spots another "expansion factor" lamp each time a middle level target is hit, lites 1 "expansion factor" lamp each time the center target is hit, allows for more initial re-lock time, and adds more to the re-lock timer when the center target is hit.

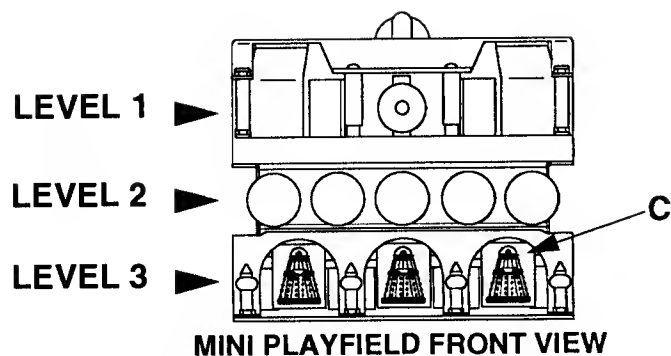
Multiball - Doctor 7

Light locks by hitting middle target (A) of "Time Expander" (mini-playfield, level 1).

Then lock 2 balls (B), to reveal the "Controls" of the "Time Expander" (level 2). The controls (C) are locked on to Earth and when activated will restore Earth time from an expansion factor of 15 to a normal factor 0. This raises the "Time Expander" to level 3 and the player must start multiball by shooting the ball into one of the 3 doors. The middle door "skips" a jackpot for a faster way to reach the "Super Davros Jackpot".

Selecting Doctor 7 allows for a faster restore of Earth time to the normal factor 0





Jackpot

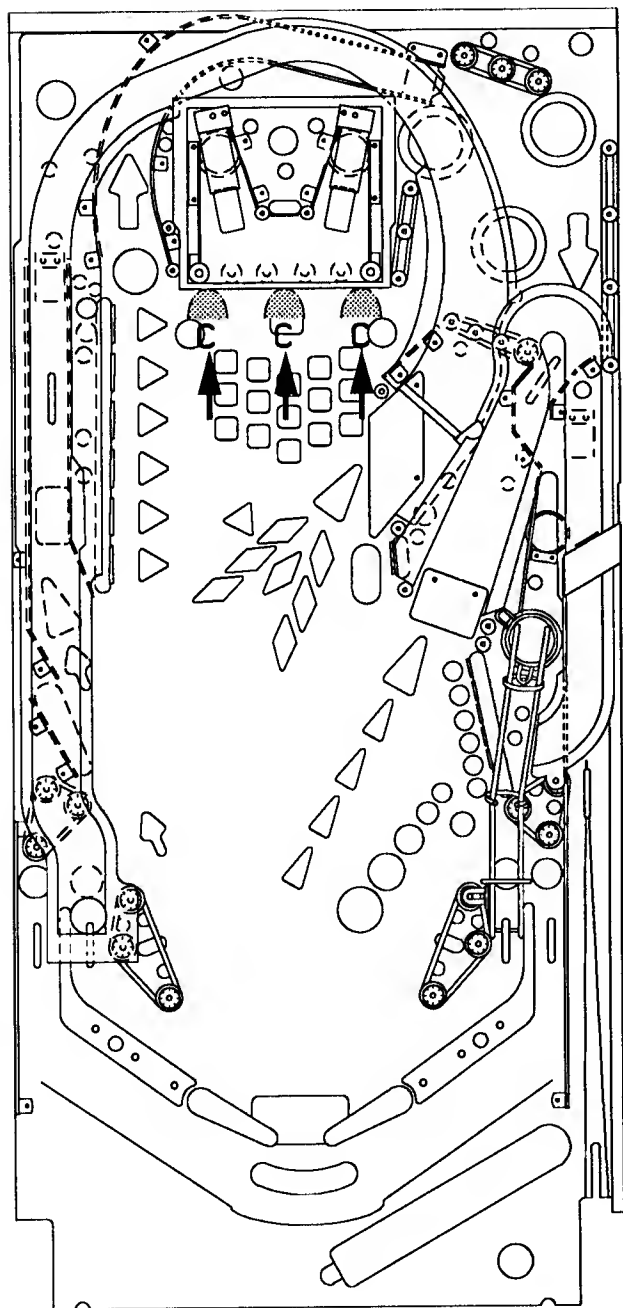
Upon start of multiball, the Daleks will march out their ranks to "exterminate the doctor", time warp then by shooting each of the 3 targets (C, Level 3) to award and build up your jackpot score. Loose 1 ball (still in 2 ball multiball) and the player will do battle with a "lesser" Dalek.

The Dalek ranks are:

Emperor Dalek	50 Million
Supreme Dalek	45 Million
Gold Daleks	40 Million
White Daleks	35 Million
Blue Daleks	30 Million
Black Daleks	25 Million
Daleks	5-20 Million

Davros Super Jackpot

100/150/200 Million Points! - after battling all the Dalek Ranks, Davros appears. He is protected by a force field that is deactivated by hitting all 5 dalek buttons (Level 2). Once the force field is removed, he too can be time warped by the 3 doors (Level 3). But beware, he has found a method of returning from time warp, and his force field is stronger!



Playfield Multiplier

Shoot up the top ramp (O) to increase playfield multiplier of ALL scores up to 4X!

Just try to time warp Davros at 4X!

Unlimited Million

Scores a total (with playfield multiplier) of 1 million points for all shots past the playfield 4X!

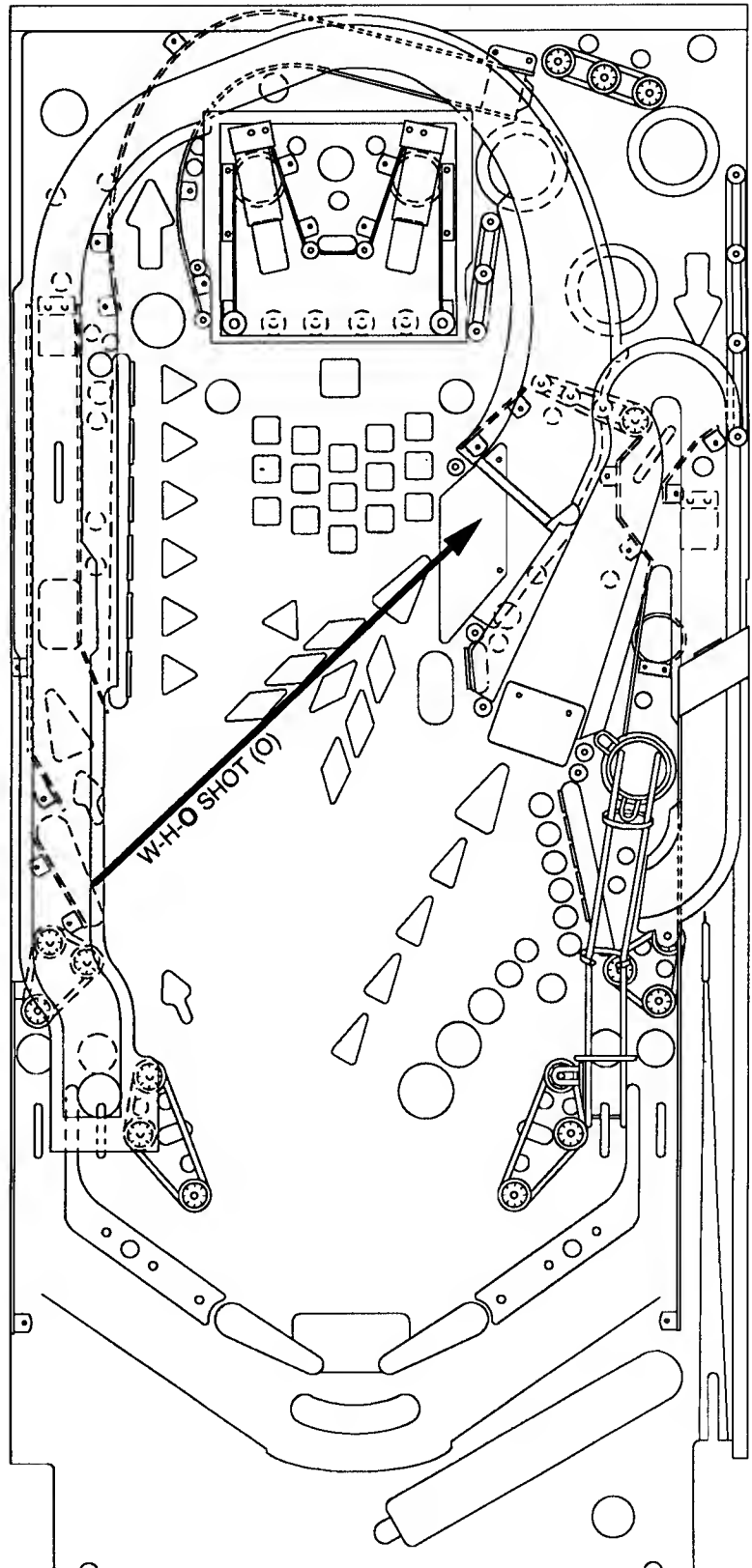
Loop Champion

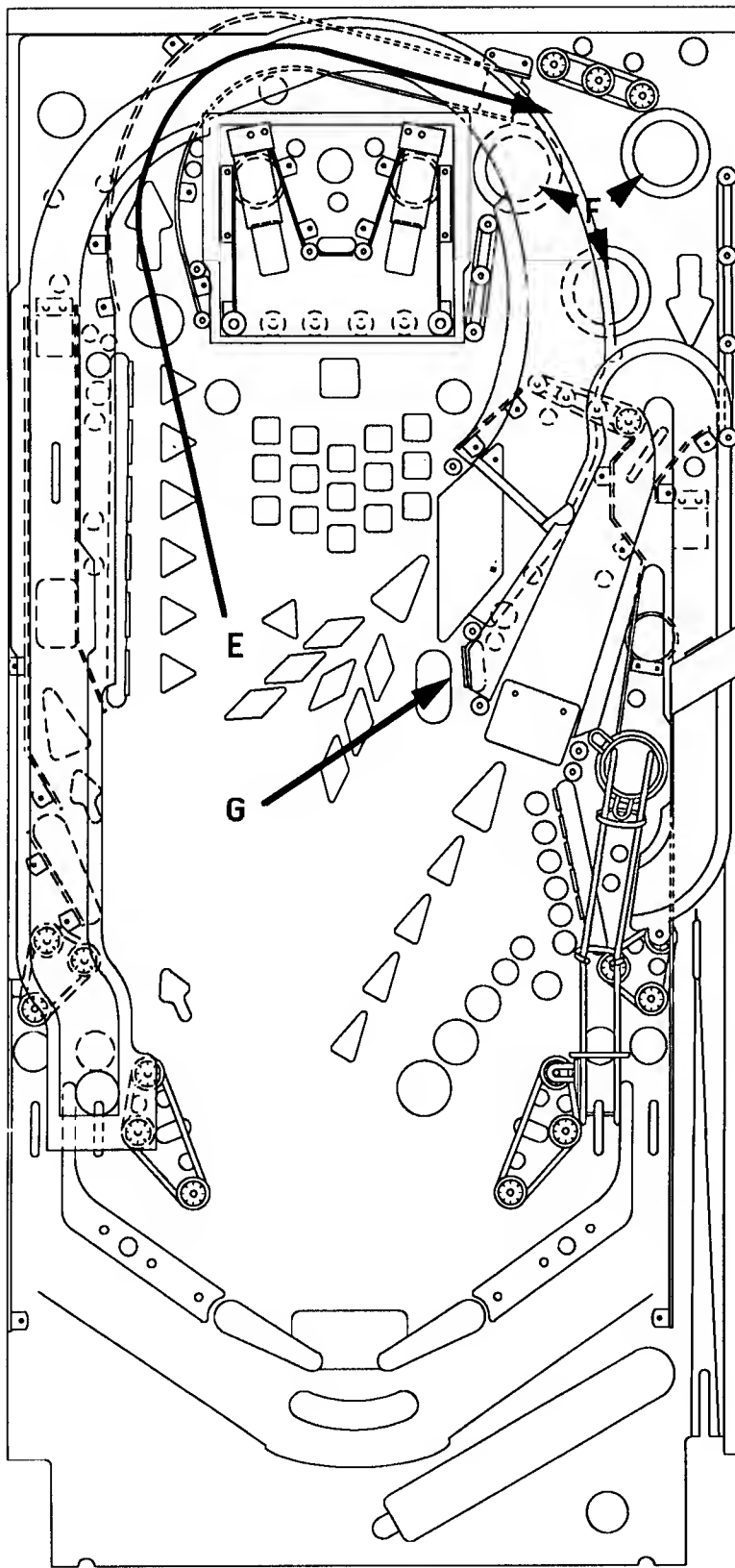
Players can compete for loop champion by beating the current loop champion.

Sonic Boom

Every 10th loop the trap door is lowered and each letter of W-H-O is now worth 10 Million Points.

Selecting Doctor 6 advances the playfield multiplier by 1X (instead of by 1/2X).





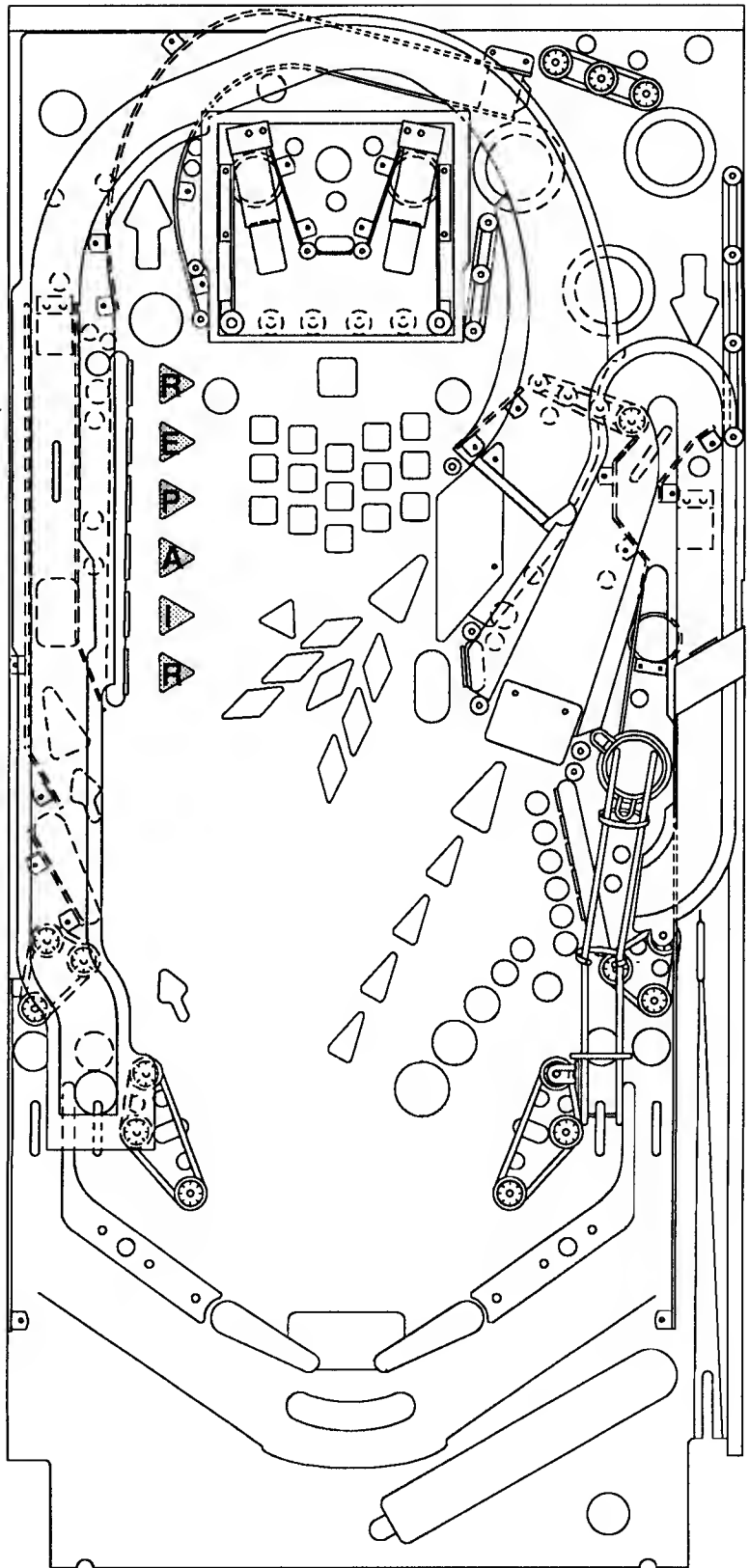
To add more doctors to the playfield - Shoot (E) at the jet bumpers (F) to build up enough power to transmat (a matter transmitter) another doctor when target (G) is blinking.

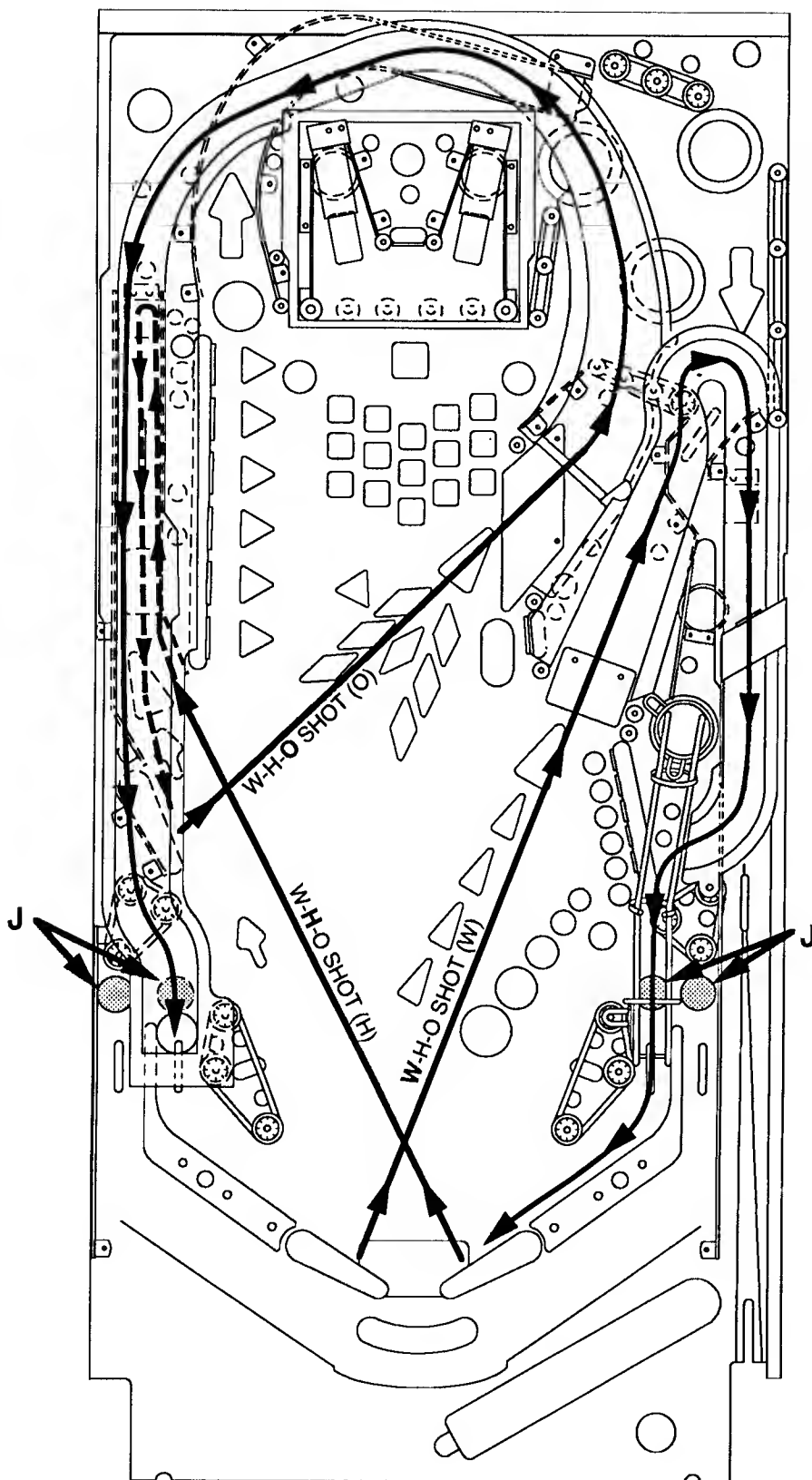
Selecting Doctor 5 increases the jet bumper score, and builds up the transmat power faster!

R.E.P.A.I.R. Millions

Repair each force fields projector (targets) before it breaks down (*these faulty force field projectors always did break down alot*) for increasing score. If all projectors are repaired (lit), each target is worth 1 Million points!

Selecting Doctor 4 repairs 2 projectors with a single target hit!





Lighting Extra Ball

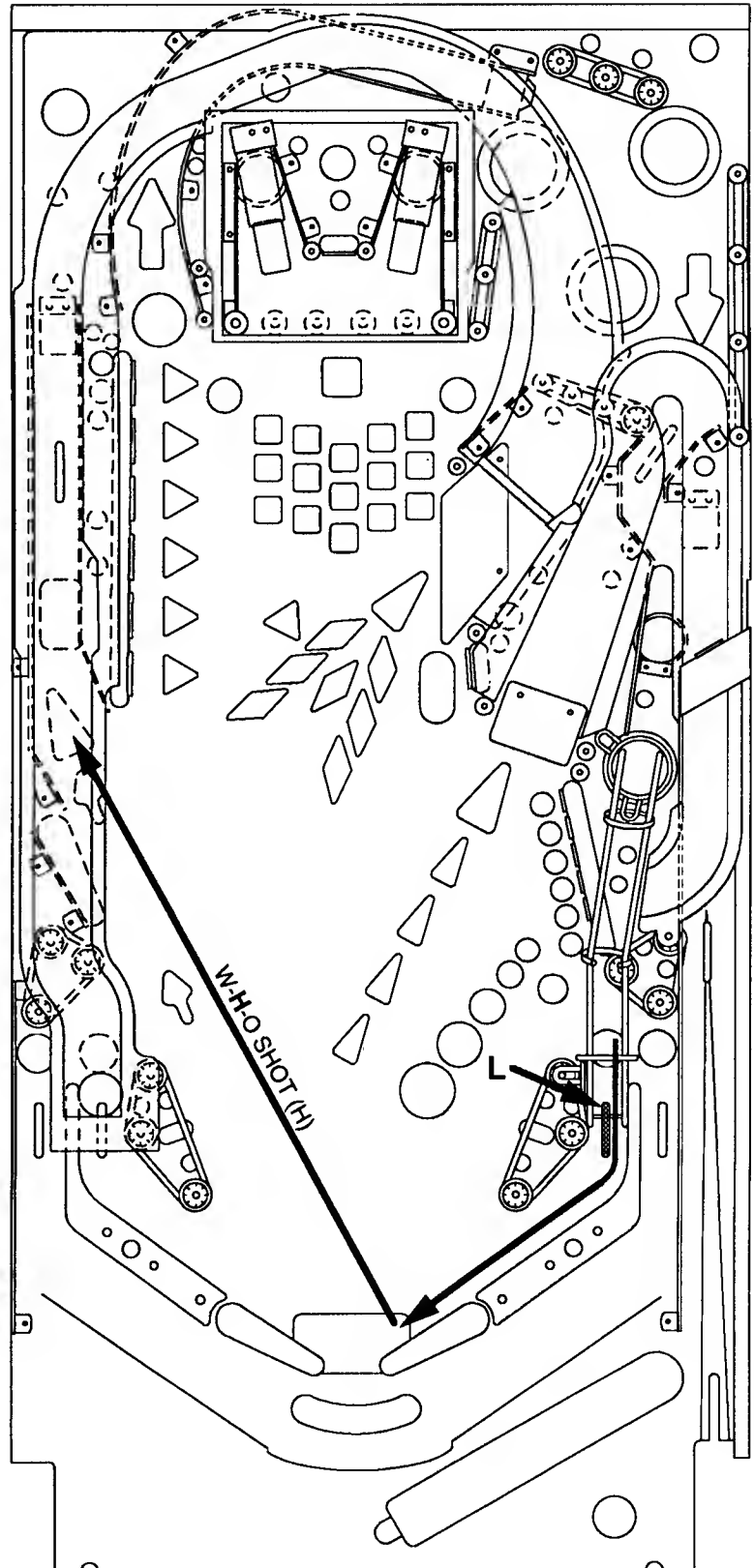
Completing the sequence of W-H-O ramp shots (W), (H), and (O), a programmable (or auto-adjustable) amount of times, will light an extra ball at lamp (J). However, the sequence must be completed in time.

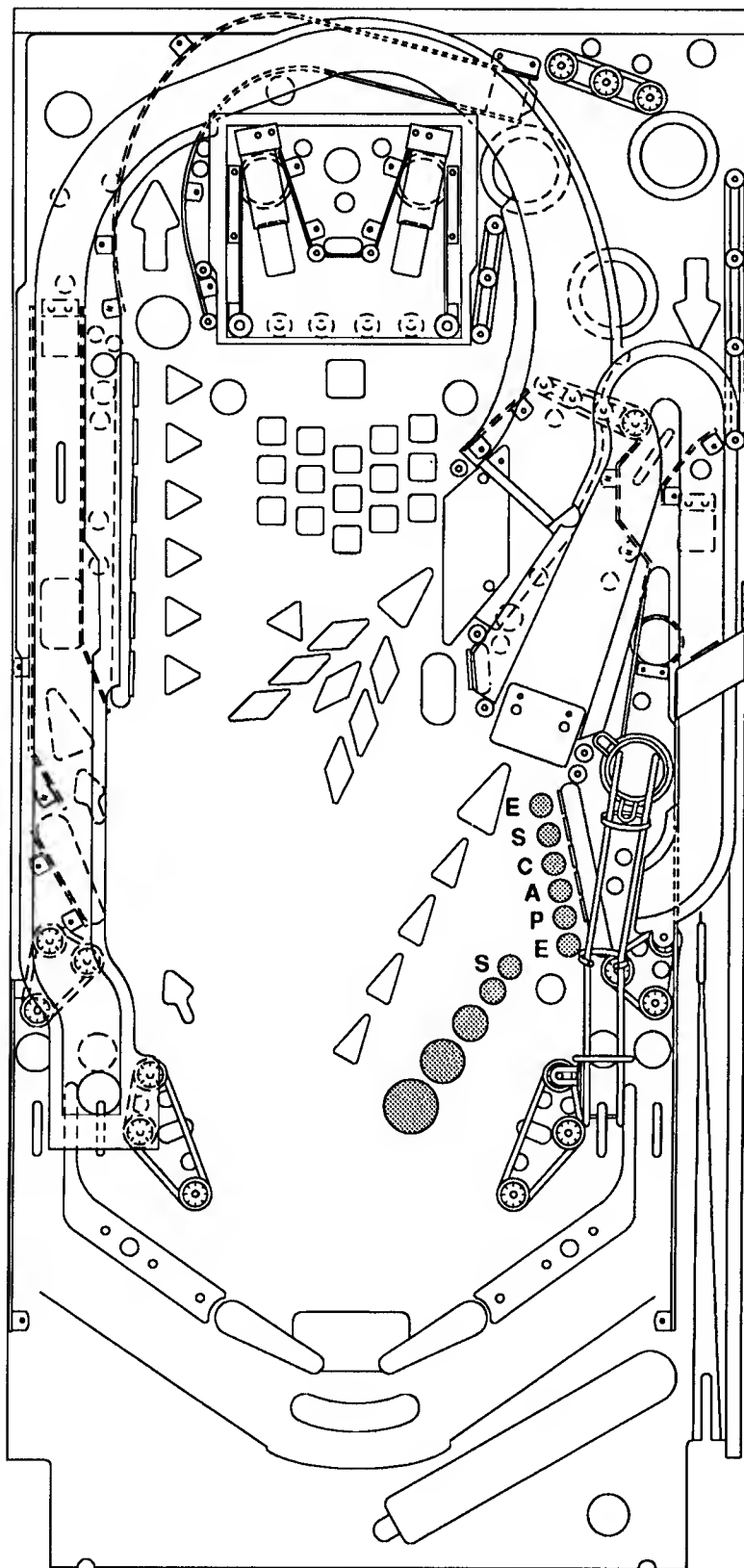
Selecting Doctor 3 allows more time to complete W-H-O, and temporarily increases its score at each letter.

Hangon Score

Lit by the right return lane (L), and collected by W-H-O shot (H) before it times out, can earn the player 250,000 to 2 million points.

Selecting Doctor 2 allows more time to complete the Hangon shot, and temporarily doubles its score.





Special
Completing ESCAPE, a
programmable number of times,
awards a Special (S).

Selecting Doctor 1 awards 2 targets
with a single target hit!

Video Mode

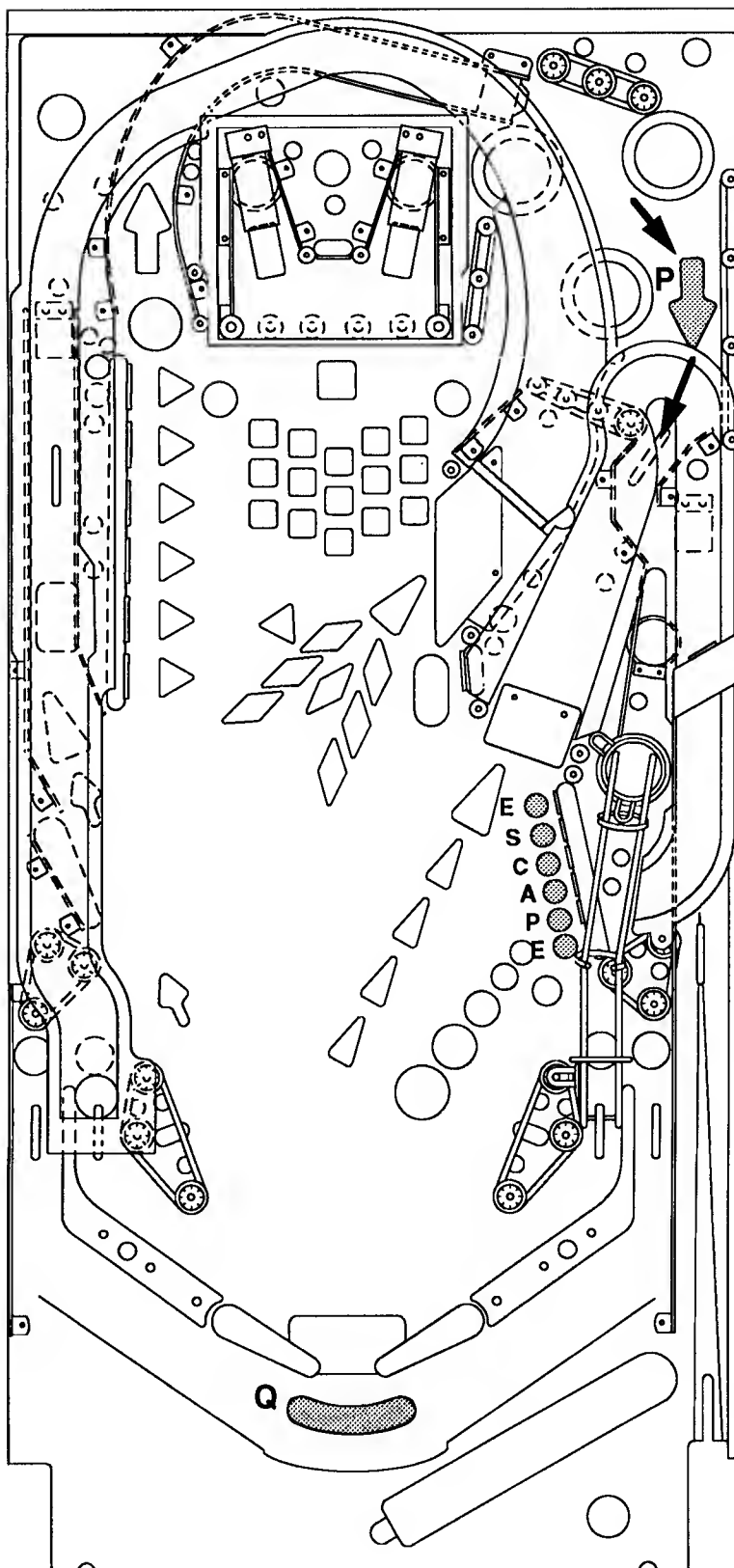
Complete ESCAPE to light Video Mode (P). *Enter to start the chase of your life!* A Dalek is on your heels with orders to capture you ALIVE (well, thank heaven for small favors). However, your path is obstructed with various obstacles that you must carefully jump over. It is wise to use 1 flipper to jump over the small obstacles, and to use 2 flippers to jump over the large obstacles. You are allowed (adjustable) a few extra lives, in case you hit an obstacle. Reach the TARDIS to avoid capture by the Dalek, (adjustable) receive big bonus points, and video mode re-lit.

Video Mode-Last Wave

This will score the sum total of all the successfully escaped video modes. Usually totaling hundreds of millions (at 1X playfield multiplier).

Second Chance (Q)

If a player does not receive a minimum of 2 seconds of play per ball, they receive a second chance, and have the ball re-served back to them.



Game Operation and Test Information

DOCTOR WHO (System WPC) ROM Summary

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game ROM 1	27020	CPU	U6	A-5343-20006-1
Music/Speech ROM 2	27040	Audio	U15	5341-13406-U15
Music/Speech ROM 3	27010	Audio	U18	A-5343-20006-3
Music/Speech ROM 4	27040	Audio	U14	5341-13406-U14

NOTICE

Order replacement ROMs from your authorized MIDWAY MANUFACTURING CO. distributor. Specify: (1) part number (if available); (2) ROM level (number) on the label; (3) game the ROM is used in.

PINBALL GAME ASSEMBLY INSTRUCTIONS

DOCTOR WHO IS A 3 BALL GAME.

Power: Domestic 120V @ 60 Hz
Foreign 230V @ 50 Hz
Japan 100V @ 50Hz

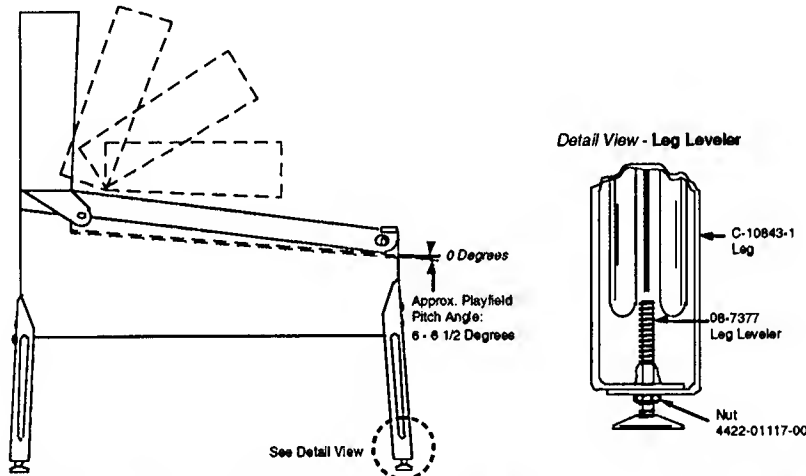
Temp: 32° F to 100° F
(0° C to 38° C)

Humidity: Not to exceed 95% relative.

Dimensions: Width: 26" Approx.
Depth: 56" Approx.
Height: 85" Approx.

Weight: Approx. 286 lbs. (crated)

1. Remove all cartons, parts, and miscellaneous items from the shipping container and set them aside.
2. Place the cabinet on a support and attach rear legs using leg bolts. Leg levelers and leg bolts are provided among the parts in the cash box.
3. Attach the front legs (after installing leg levelers), using leg bolts. See diagram below.



Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.
5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass, storing it carefully to avoid scratches. Remove the shipping block holding the Insert Board. Unlatch and open the Insert Board. Carefully lift the Speaker Panel and lay it down on the playfield glass. Be careful not to damage the Dot Matrix Display/Driver Board. This allows access to the bolt holes used for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close the Insert Board and latch it in position. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.

⚠ CAUTION

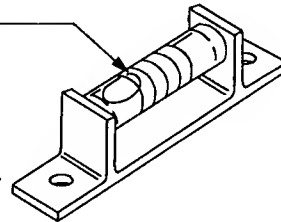
FAILURE TO INSTALL the backbox mounting hardware properly can cause personal injury.

NEVER TRANSPORT a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler slightly below the leg bottom, so that all four foot pads protrude approximately the same distance. Remove the cabinet from its support and place it on the floor.

7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game, to release the front molding. Lift the front molding off the playfield cover glass, return the latch lever to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.
8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). NOTE: It is recommended that these measurements be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.
9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch for Doctor Who is between 6 and 6 1/2 degrees. The NOSE of the bubble is between the first and second line on the level (see diagram below).

TRU-PITCH™ level between 6 and 6 1/2 degrees.



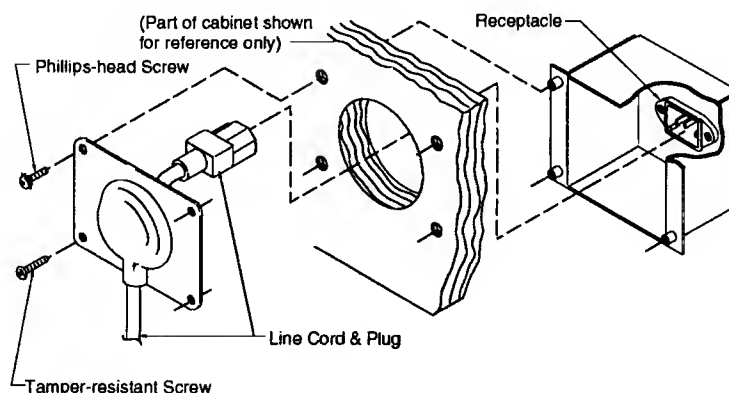
CAUTION

Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting.

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.
11. Verify that the **required number** of balls are installed in the game. **DOCTOR WHO** uses 3 balls.
12. Install playfield mylars if desired.

NOTE: The **Doctor Who** playfield is specially coated with a Diamond Plate™ surface and does not require a protective mylar. However, playfield mylars can be purchased through your local Bally Distributor. Specify part number 03-7960-20006-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass, reversing the procedure of step 7.
14. To attach line cord, remove envelope stapled to the inside cabinet (near cashbox). Remove the four Phillips-head screws that mount the line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle and push line cord securely into place. Make sure cord is aligned with the indentation of plate (indentation should point toward bottom of cabinet). Remount line cord cover plate. If desired, tamper resistant screws have been provided in an envelope marked "Security Screws" (located in cashbox) to remount cover plate. Prepare the game for player operation.



GAME CONTROL LOCATIONS

Cabinet Switches

The On-Off switch is located on the bottom of the cabinet near the right front leg.

The Start Button is the pushbutton to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

Coin Door Switches

The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four pushbutton switches mounted on the inside of the coin door. The Coin Door Switches have two modes of operation Normal Function and Test Function.

Normal Function

The Service Credits button puts credits on the game that are not included in any of the game audits.

The Volume Up button raises the sound level of the game. Press and hold the button until the desired level is reached.

The Volume Down button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound OFF completely.

The *Begin Test button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

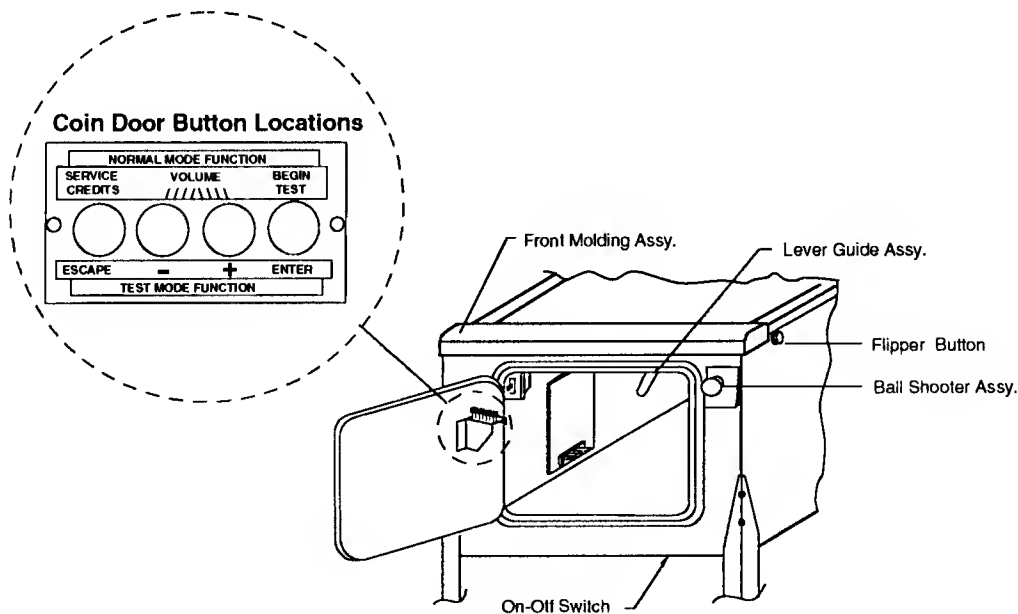
Test Function

The Escape button allows you to get out of a menu selection or return to the Attract Mode.

The Up button allows you to cycle forward through the menu selections or adjustment choices.

The Down button allows you to cycle backward through the menu selections or adjustment choices.

The *Enter button allows you to get into a menu selection or lock in an adjustment choice.



** To reset High Score, hold down the Begin Test/Enter switch for 5 seconds while in the Attract Mode.*

GAME OPERATION

CAUTION

After assembly and installation at the site location, this game must be plugged into a properly grounded outlet to prevent shock hazard, and to assure proper game operation. DO NOT use a 'cheater' plug to defeat the ground pin on the line cord. DO NOT cut off the ground pin.

POWERING UP. With the coin door closed, plug the game in and switch it On. In normal operation, testing will show in the display as the game performs Start-Up Tests. Once the Start-Up Tests have been successfully completed the last score is displayed. Afterward, the game goes into the Attract Mode.

Note: After the game has been on location for a period of time, the Start-Up Tests may contain messages concerning game problems. See 'Error Messages' for more detailed information regarding messages.

Open the coin door and press the Begin Test Switch. The display shows the game name, number, and software revision. The message changes. The display shows the sound software revision, revision level of the system software and date the game software was revised.

Example:

DOCTOR WHO	Sound Rev. L-1
20006	Sy. 2.31 6/24/92
Rev. P-2	

Press the Enter button to enter the WPC Menu System (refer to the section entitled 'Menu System Operation' for more information). Perform the entire Test Menu routine to verify the game is operating satisfactorily.

ATTRACT MODE*. After completing the Test Menu routine, press the Escape button three times to enter the Attract Mode. During the Attract Mode the display shows a series of messages informing the player of the recent highest scores*, "custom messages*", and the score to achieve to obtain a replay award*

CREDIT POSTING. Insert coin(s). A sound is heard for each coin and the display shows the number of credits purchased. So long as the number of maximum allowable credits* are NOT exceeded by coin purchase or high score, credits are posted correctly.

STARTING A GAME. Press the Start button once. A startup sound plays and the credit amount shown in the display decreases by one. The display flashes 00 (until the first playfield switch is actuated), and shows ball 1. If credits are posted, additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

TILTS. Actuating the Slam Tilt switch inside the cabinet ends the current game and proceeds to the Game Over Mode. With the third closure* of the plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

END OF GAME. All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set* appears in the display. Credit* may be awarded when the last two digits of any player's score match the random digits. Match, high score, and game over sounds are made, as appropriate.

GAME OVER MODE. Game Over will show in the display. Afterward, the high scores flash on the display. The game proceeds to the Attract Mode.

*Operator-adjustable feature.

GAME CHECK-OUT

Game Check-out is a special feature designed to be a rapid method of detecting problems in the game. To start the check-out program, press and hold the enter button while in either the attract mode or during a game. While holding the enter button, wait for the "To Reset Scores" title screen to appear on the display. When it appears, continue to hold down the enter button and simultaneously press the up and down buttons. The "Ckout" title screen will appear. The buttons can now be released.

For Doctor Who, a warning message will appear next. The message warns to *keep fingers away from the moving mini-playfield* (also known as the "Time Expander"). Confirmation of this message is necessary by pressing the advance button. As a safety feature, during the test(s) that require the movement of the mini-playfield, the display will show the message "press and hold both flipper buttons". The mini-playfield will not move until these buttons are pressed.

The Check-out program is arranged into seven individual tests:

1. Ckout: Game features
2. Ckout: Normal Switch Levels
3. Ckout: Vibration test for sensitive switches and lamps
4. Ckout: Solid State Flippers
5. Ckout: Outhole, trough and shooter lane tests
6. Ckout: Coin Slots
7. Ckout: Switch Edges, manually operating all switches

The program will always test for a shorted switch row. Any test can be interrupted to have a picture of the switch matrix (from switch test) appear on the Dot Matrix Display to show the offending short.

Button Operation:

The Escape Button will stop any test at any time and return to the attract mode.

The Up Button will abort the current test and go to the next test.

The Down Button will abort the current test and return to the previous test.

The Enter Button is used to continue a test when an error occurs.

1. Ckout: Game Features

This section tests;

- A) The mini-playfield positioning opto (if enabled from feature adjustments).
- B) The mini-playfield opto ejects, switch, and coil (if enabled from feature adjustments).
- C) The opto popper switch and coil. The plunger on the opto popper and opto ejects will always trigger the opto beam. The program expects this to happen, even if there is no ball in the device. Otherwise a "Solenoid Switch Error" message is displayed along with the switch number, name, and switch state.
- D) The Trap Door (if enabled from feature adjustments).

Tests A and E report the same error messages from their respective diagnostic test. Refer to the individual diagnostic tests, at the end of Section One, for more details.

When all devices have passed their test, the display will read "PASSED".

2. Ckout: Normal Switch Levels

This test assumes that all 3 balls are in the trough. Any switches that are normally in the wrong state are displayed. Examine the switch to determine the cause of this problem. **WARNING:** All ejects, poppers, outhole, and shooter kickers will start kicking when their switch is activated.

The display will read "Pass" when all switches are in their proper state.

3. Ckout: Vibration

This test will check for sensitive switches and lamps. When all lamps are turned on, the operator must visually look for lamps that are burnt out and watch for lamps that "blink", indicating a loose connection.

All game solenoids are pulsed in a "slow" pattern, then in a "fast" pattern. Any switches that change their state will stop the test and be displayed. Adjust the switch as needed then press the enter button to continue. As a general rule when the outhole, trough, or shooter solenoid is activated it should not trigger its' switch.

4. Ckout: Solid State Flippers

All flippers are activated to warm-up the coils. The flippers are then flipped 4 times (1 at a time). Their response and delta millisecond time is measured until the end-of-stroke switch is hit. A (fast) flipper can indicate that the end-of-stroke switch is adjusted too close, too early. A (slow) flipper can be a binding or dirty flipper. A stuck-on or -off flipper can be either a coil (assuming the flipper did not move), mechanical binding flipper, or grossly mis-adjusted flipper end-of-stroke switch. A high delta time (>4ms) can indicate a dirty end-of-stroke switch, or a mis-adjusted "backing" plate on that switch.

5. Ckout: Outhole, Trough, and Shooter Lane

This test begins with all the balls in the trough. It starts by "machine gunning" the outhole solenoid to see if the outhole switch is wrongly activated. Two balls are served into the shooter lane, if a ball is mis-served or if any trough switches do not open or close in time, they are reported in the display. The test is normally stopped, and the operator can continue the test by pressing the enter button. After the last ball is served, the trough solenoid is "machine gunned" and should not activate any of the trough switches. When this succeeds, the shooter clears the last ball and "machine guns" also. Then, the outhole is activated to feed the trough until all 3 balls are back.

Note, when an error occurs, press the enter button to continue the test.

Note, some amount of mis-served balls is acceptable.

6. Ckout: Coin Slots

This test is for coin doors that are switch activated and is performed manually by the operator. No audits or game credits are effected by this test. First, close the coin door so that the coin balancers are aligned with the incline of the playfield. *The test will NOT start until the coin door is closed.* At this point the coin door may be opened, but this test works best when coins are inserted with the coin door closed. Next, identify which coin slots are being used by putting 1 coin in each slot to be tested (the coin should activate the coin chute switch). Then, insert coins until the chute is marked "OK". If the chute is marked "NG" (no good), look at the measurements of "ON" time. If it is more than 500ms, the switch is considered stuck on. Typically, a quarter ranges from 40ms to 300 ms, any reading above this can indicate that the switch actuator needs adjustment (the actuator should be able to move all the way down and touch the bottom stop position). The full operating range is a minimum of 20ms (A.3 23) on to start, to a maximum of 500ms on, then an off time of at least 150ms.

Display Explanation: The first number after the name of the coin chute is the debounced millisecond "ON" time.

Note, the bottom two lines are a timing line of the coin switch. Each dot represents 2ms (milliseconds) of time (0.002 seconds). The left side of the screen represents the past 128*2ms or 256ms. The right side of the screen represents the current time. The second from the bottom line of dots indicate a closed coin switch. The bottom line of dots indicate an open coin switch.

The slam switch (designed to ignore coins when the game is being abused) will make its "SLAM" sound when activated (for adjustment purposes).

7. Ckout: Switch Edges

This test is performed by manually operating all switches with a ball (never use fingers) at least twice. It is recommended that each switch be activated 3 times. This will catch most sticky switches.

The controlled lamps are cycled in a pattern to reveal lamps that have a shorted diode. If a lamp does not turn off completely, it usually has a shorted diode. However, more than 1 shorted diode can falsely make others look bad.

All flashers are flashed for about 30 seconds. For Doctor Who there are 12 bulbs on the playfield, 10 bulbs in the insert, and 1 bulb in the Dalek (if used) on the top of the backbox.

MENU SYSTEM OPERATION

This game operates on a Menu System. The Main Menu allows you to choose from several main categories, which in turn lead to other menus to choose from. To enter the Menu System, open the coin door and press the Begin Test button. The displays show the Game I.D. Mode. Press the Enter button and the Main Menu appears. To cycle through the Main Menu selections press either the Up or Down button. Activate any selection by pressing the Enter button when the desired selection appears in the displays. Return to the Attract Mode or a previous menu selection, press the Escape button. Press the Start button for HELP at any time.

Main Menu

B. Bookkeeping Menu	B.1 Main Audits
	Etc., etc.
	B.2 Earnings Audits
	Etc., etc.
	B.3 Standard Audits
	Etc., etc.
P. Printouts Menu	B.4 Feature Audits
	Etc., etc.
	B.5 Histograms
	Etc., etc.
	B.6 Time-Stamp
	Etc., etc.
T. Test Menu	P.1 Earnings Data
	P.2 Main Audits
	P.3 Standard Audits
	P.4 Feature Audits
	P.5 Score Histograms
	P.6 Game Time Histograms
U. Utilities Menu	P.7 Time-Stamp
	P.8 All Data
	T.1 Switch Edges
	T.2 Switch Levels
	T.3 Single Switches
	T.4 Solenoid Test
A. Adjustments Menu	T.5 Flasher Test
	T.6 General Illumination
	T.7 Sound & Music Test
	T.8 Single Lamps
	T.9 All Lamps
	T.10 Lamp & Flasher Test
	T.11 Display Test
	T.12 Flipper Test
	T.13 Trap Door Test
	T.14 Mini-playfield Test
	U.1 Clear Audits
	U.2 Clear Coins
	U.3 Reset H.S.T.D.
	U.4 Set Time & Date
	U.5 Custom Message
	U.6 Set Game I.D.
	U.7 Factory Adjustments
	U.8 Factory Resets
	U.9 Presets
	Etc., etc.
	U.10 Clear Credits
	U.11 Auto Burn-In
	A.1 Standard Adjustments
	Etc., etc.
	A.2 Feature Adjustments
	Etc., etc.
	A.3 Pricing Adjustments
	Etc., etc.
	A.4 H.S.T.D. Adjustments
	Etc., etc.
	A.5 Printer Adjustments

Press Escape

To move out of a menu selection.

Press Enter

To get into a menu selection.

Press Up

Increases sequence; Example A.1, A.2, A.3, A.4.

Press Down

Decreases Sequence; Example A.4, A.3, A.2, A.1.

Use Up and Down to cycle through the selections in a menu.

Use Escape and Enter to move into and out of the selected menu

Bookkeeping is the first category available from the Main Menu. Press the Enter button to activate the Bookkeeping Menu. Press the Up or Down button to cycle through the selections. Press the Enter button to activate a selection. Once activated, press the Up or Down button to cycle through the available audits. Audits cannot be set, they can only be cleared by using U1 and U2 from the Utilities Menu. Press the Escape button to return to the Bookkeeping Menu. Press it again to return to the Main Menu.

B. BOOKKEEPING MENU

- B.1 Main Audits**
- B.2 Earning Audits**
- B.3 Standard Audits**
- B.4 Feature Audits**
- B.5 Histograms**
- B.6 Time-Stamped**

One Button Audit System. The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

B.1 Main Audits

B.1	01	Total Earnings	00
B.1	02	Recent Earnings	00
B.1	03	Free Play Percent	00
B.1	04	Average Ball Time	00
B.1	05	Average Game Time	00
B.1	06	Total Plays	00
B.1	07	Replay Awards	00
B.1	08	Percent Replays	00
B.1	09	Extra Balls	00
B.1	10	Percent Extra Ball	00

B.2 Earning Audits*

B.2	01	Recent Earnings	00
B.2	02	Recent Left Slot	00
B.2	03	Recent Center Slot	00
B.2	04	Recent Right Slot	00
B.2	05	Recent 4th Slot	00
B.2	06	Recent Paid Credits	00
B.2	07	Recent Service Credits	00
B.2	08	Total Earnings*	00
B.2	09	Total Left Slot*	00
B.2	10	Total Center Slot*	00
B.2	11	Total Right Slot*	00
B.2	12	Total 4th Slot*	00
B.2	13	Total Paid Credits*	00
B.2	14	Total Service Credits*	00

*These audits are NOT resettable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time-Stamp.

B.3 Standard Audits

B.3	01	Games Started	00
B.3	02	Total Plays*	00
B.3	03	Total Free Play	00
B.3	04	Free Play Percent	00
B.3	05	Replay Awards	00
B.3	06	Percent Replays	00
B.3	07	Special Awards	00
B.3	08	Percent Special	00
B.3	09	Match Awards	00
B.3	10	Percent Match	00
B.3	11	H.S.T.D. Credits	00
B.3	12	Percent H.S.T.D	00
B.3	13	Extra Ball	00
B.3	14	Percent Extra Ball	00
B.3	15	Tickets Awarded	00
B.3	16	Percent Tickets	00
B.3	17	Left Drains	00
B.3	18	Right Drains	00
B.3	19	Average Ball Time	00
B.3	20	Average Game Time	00
B.3	21	Play Time	00:00:00
B.3	22	Minutes On	00
B.3	23	Balls Played	00
B.3	24	Tilts	00
B.3	25	Replay 1 Awards	00
B.3	26	Replay 2 Awards	00
B.3	27	Replay 3 Awards	00
B.3	28	Replay 4 Awards	00
B.3	29	1 Player Games	00
B.3	30	2 Player Games	00
B.3	31	3 Player Games	00
B.3	32	4 Player Games	00
B.3	33	H.S.T.D. Reset Count	00
B.3	34	Burn-in Time †	00:00:00
B.3	35	1st Replay Level	00
B.3	36	Left Flipper	00
B.3	37	Right Flipper	00

* "Total Plays" only counts completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored, therefore test and servicing operations do not affect the Audits.

† This Audit is not resettable.

B.4 Feature Audits

B.4	01	All Locks	Doctor 7	00
B.4	02	All Multiballs		00
B.4	03	2 Ball Rematch		00
B.4	04	3 Ball Rematch		00
B.4	05	All Jackpots		00
B.4	06	Davros Jackpots		00
B.4	07	Skipped Jackpots		00
B.4	08	2 Ball Jackpots		00
B.4	09	1st 2 Ball Jackpots		00

B.4 Feature Audits Continued...

B.4	10	2nd 2 Ball Jackpots		00
B.4	11	3rd 2 Ball Jackpots		00
B.4	12	4th 2 Ball Jackpots		00
B.4	13	5th 2 Ball Jackpots		00
B.4	14	3 Ball Jackpots		00
B.4	15	1st 3 Ball Jackpots		00
B.4	16	2nd 3 Ball Jackpots		00
B.4	17	3rd 3 Ball Jackpots		00
B.4	18	4th 3 Ball Jackpots		00
B.4	19	5th 3 Ball Jackpots		00
B.4	20	Playfield 1.5X Lit	Doctor 6	00
B.4	21	Playfield 2.0X Lit		00
B.4	22	Playfield 2.5X Lit		00
B.4	23	Playfield 3.0X Lit		00
B.4	24	Playfield 3.5X Lit		00
B.4	25	Playfield 4.0X Lit		00
B.4	26	Playfield Millions		00
B.4	27	Transmat Doctor Lit	Doctor 5	00
B.4	28	Transmat Doctor Award		00
B.4	29	R.E.P.A.I.R. 1 Lamps	Doctor 4	00
B.4	30	R.E.P.A.I.R. 2 Lamps		00
B.4	31	R.E.P.A.I.R. 3 Lamps		00
B.4	32	R.E.P.A.I.R. 4 Lamps		00
B.4	33	R.E.P.A.I.R. 5 Lamps		00
B.4	36	R.E.P.A.I.R. Millions		00
B.4	37	W-H-O "W" Awards	Doctor 3	00
B.4	38	W-H-O "H" Awards		00
B.4	39	W-H-O Total Awards		00
B.4	40	1st WHO Awards		00
B.4	41	2nd WHO Awards		00
B.4	42	3rd WHO Awards		00
B.4	43	4th WHO Awards		00
B.4	44	Sonic Boom 10 Million		00
B.4	34	Extra Ball Lit		00
B.4	35	Hang On Awards	Doctor 2	00
B.4	45	Collision Awards		00
B.4	46	1 E.S.C.A.P.E. Bonus	Doctor 1	00
B.4	47	2 E.S.C.A.P.E. Bonus		00
B.4	48	3 E.S.C.A.P.E. Bonus		00
B.4	49	4 E.S.C.A.P.E. Bonus		00
B.4	50	5 E.S.C.A.P.E. Bonus		00
B.4	51	Special Lit		00
B.4	52	Video Mode	Miscellaneous	00
B.4	53	Video Mode Captured		00
B.4	54	Video Mode Escaped		00
B.4	55	Video Mode Extra Balls		00
B.4	56	Video Mode Seconds		00
B.4	57	Bonus X's		00
B.4	58	Second Chance		00
B.4	59	Mini Playfield Faults	Game Problems	00
B.4	60	Trap Door Faults		00
B.4	61	Not Used		00
B.4	62	Other Switch Faults		00

B.5 Histograms

B.5	01	0-1.9 Million Scores	00%	00
B.5	02	2-4.9 Million Scores	00%	00
B.5	03	5-9.9 Million Scores	00%	00
B.5	04	10-19 Million Scores	00%	00
B.5	05	20-29 Million Scores	00%	00
B.5	06	30-39 Million Scores	00%	00
B.5	07	40-49 Million Scores	00%	00
B.5	08	50-69 Million Scores	00%	00
B.5	09	70-99 Million Scores	00%	00
B.5	10	100-149 Million Scores	00%	00
B.5	11	150-199 Million Scores	00%	00
B.5	12	200-299 Million Scores	00%	00
B.5	13	Over 300 Million	00%	00
B.5	14	Game Time 0.0-1.0 Mins	00%	00
B.5	15	Game Time 1.0-1.5 Mins	00%	00
B.5	16	Game Time 1.5-2.0 Mins	00%	00
B.5	17	Game Time 2.0-2.5 Mins	00%	00
B.5	18	Game Time 2.5-3.0 Mins	00%	00
B.5	19	Game Time 3.0-3.5 Mins	00%	00
B.5	20	Game Time 3.5-4.0 Mins	00%	00
B.5	21	Game Time 4-5 Mins	00%	00
B.5	22	Game Time 5-6 Mins	00%	00
B.5	23	Game Time 6-8 Mins	00%	00
B.5	24	Game Time 8-10 Mins	00%	00
B.5	25	Game Time 10-15 Mins	00%	00
B.5	26	Game Time Over 15 Mins	00%	00

B.6 Time-Stamps

The Time-Stamps Menu allows you to view dates and times that are important to game software.

B.6	01	Current Time
B.6	02	Clock 1st Set
B.6	03	Clock Last Set
B.6	04	Audits Cleared
B.6	05	Coins Cleared
B.6	06	Factory Setting
B.6	07	Last Game Start
B.6	08	Last Replay
B.6	09	Last H.S.T.D. Reset
B.6	10	Champion Reset
B.6	11	Last Printout
B.6	12	Last Service Credit

Press the Enter button to activate the Printouts Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Printouts Menu selections. Press the Enter button to activate the desired Printouts group. Press again to return to the Main Menu.

P. PRINTOUTS MENU

(optional board required)

- P.1 Earnings Data**
- P.2 Main Audits**
- P.3 Standard Audits**
- P.4 Feature Audits**
- P.5 Score Histograms**
- P.6 Time Histograms**
- P.7 Time-Stamped**
- P.8 All Data**

The Printouts Menu is a combination of the other menus. This menu allows you to access and print information in the available menu selections.

If no printer is attached the message "Waiting for Printer" appears in the displays.
Note: Set print specification from the Adjustment Menu, A.5 Printer Adjustments.

Press the Enter button to activate the Test Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Test Menu selections. Press the Enter button to activate a test. Press the Escape button to return to the Test Menu. Press again to return to the Main Menu. Note: During any test, press the Start button (Help) to obtain the wire color, driver number, connector number, and fuse location.

T. TEST MENU

T.1	Switch Edges
T.2	Switch Levels
T.3	Single Switch
T.4	Solenoid Test
T.5	Flasher Test
T.6	General Illumination
T.7	Sound & Music Test
T.8	Single Lamps
T.9	All Lamps
T.10	Lamp & Flasher Tests
T.11	Display Test
T.12	Flipper Test
T.13	Trap Door Test
T.14	Mini-playfield Test

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, and a square indicates the switch is closed. The numbers assigned to each switch indicate where the switch is located in the matrix. The number on the left indicates the column, and the number on the right indicates the row. Example: Switch 23 is 2nd column, 3rd row.

A short to ground, on either the row or column wire, appears as a shorted row(s). However, a column wire shorted to ground disappears when all the indicated row switches are open. A row wire shorted to ground does not disappear.

A shorted diode in the switch matrix can cause other switches to appear closed. These "phantom" switches (though not actually closed) complete a rectangle in the switch matrix. Therefore, if two switches in the same column are closed (example; #22 and #24), and a third switch is pressed in another column but in the same row as one of the first two (example; #32), the "phantom" switch #34 is falsely indicated as closed. The switch with the shorted diode is diagonally opposite the "phantom" switch (in this case #22).

T.1 Switch Edges

Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

T.2 Switch Levels

This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

T.3 Single Switches

The Single Switch Test isolates a particular switch by blocking signals from all other switches. Use the Up or Down buttons to select the switch to be tested.

T.4 Solenoid Test

The Solenoid Test has three modes: Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if; more then one solenoid pulses, a solenoid comes On and stays On, or during the Repeat or Run modes, no solenoid pulses.

- Repeat - The Repeat mode pulses a single solenoid. After entering this test, Solenoid 1 shows in the display. and the corresponding solenoid activates. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop mode halts the Solenoid Test. Press Enter during the Repeat mode and the Solenoid Test Stops. No solenoids should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Running - The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.5 Flasher Test

This tests the flashlamp part of the solenoid circuit exclusively. This, like the Solenoid Test has three test modes: Repeat, Stop, and Run. During this test, only one flashlamp circuit should pulse at a time. The system has detected a problem if more than one circuit pulses, a circuit stays On, or during the Repeat or Run modes, no circuit pulses.

- Repeat - The Repeat mode pulses a single flashlamp. After entering this test, the name and number of the first flashlamp circuit will show in the display and the corresponding bulb(s) flash. Press the Up or Down button to cycle through all of the flashlamp circuits one at a time. The same circuit pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop mode halts the Flasher Test. No flashlamp circuit should be active during this mode. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Running - The Run mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed and the corresponding bulb(s) flash. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.6 General Illumination

This test checks all of the General Illumination circuits. There are two modes of operation: Stop and Run.

- Stop
 - Press the Up or Down buttons to cycle through the General Illumination Test manually. All illumination is tested first, followed by an individual circuit test. The circuit name and number will show in the display while the corresponding lamps light. If any other results occur the system has detected an error.
- Run
 - Press the Enter button any time during Stop test mode and the General Illumination Test cycles through automatically. For each circuit shown in the displays the corresponding bulbs should light. If any other results occurs the system has detected a problem.

T.7 Sound and Music Test The Sound and Music Test allows you to check the audio circuits. This test has three modes for testing the sound and music circuits: Run, Repeat, and Stop.

- Run
 - This Run mode steps through a sequence of sounds and music. Pressing the Up or Down button during this portion of the Sound and Music test advances to a particular sound/tune without having to wait for the program to play all the sounds available in the test. A sound/tune should be heard for each name and number that appears in the display. Any other results indicate the system has detected a problem.
- Repeat
 - Press the Enter button at any time during the Run mode to cause the program to stop and repeat a particular sound/tune. The same sound should repeat continuously until the Up or Down button is pressed. Any other results indicates the system has detected a problem.
- Stop
 - Press the Enter button at any time during the Repeat mode to stop this test altogether. No sound/tune should be heard. Any other results indicates the system has detected a problem.

T.8 Single Lamp Test The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example: Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through this test. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicate the system has detected a problem.

T.9 All Lamps Test This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicate the system has detected a problem.

T.10 Lamp and Flasher Test This test causes all the flashlamps and the controlled lamps to flash at the same time. The controlled lamps blink, while the flashlamps cycle from highest to lowest. Any other results indicates the system has detected a problem.

T.11 Display Test This test automatically lights every dot in the Dot Matrix Display. A series of patterns appear in sequence. Each pattern turns On and Off a section of dots. Every dot on the display should be turned On and Off during this test.

T.12 Flipper Coil Test The Flipper Coil Test has three modes: Repeat, Stop, and Run. Only one flipper should pulse at a time. The system has detected a problem if; more than one flipper pulses, a flipper comes On and stays On, or during the Repeat or Run modes, no flipper pulses.

- Repeat - The Repeat mode pulses a single flipper. After entering this test, Coil ? shows in the display and the corresponding flipper activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same flipper coil pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop mode halts the Flipper Coil Test. Press Enter during the Repeat mode and the Flipper Coil Test stops. No flipper coil should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Running - The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.13 Trap Door Test

The Dot Matrix display (left side) shows a side view of the trap door mechanism. The top line (right side) identifies the two sub-tests. The second line indicates the current test mode. The third line shows the "number of faults" or errors (from the feature audits). *Note, pressing the credit button during this test will clear the fault number (for easier detection of intermittent problems when cycled overnight).* And the fourth line is a status line, showing the current "moving" or "error" state.

NOTE: If there are 2 errors with the last 2 complete test cycles, the mode will automatically set itself to "STOPPED" mode. This should prevent accidental damage to the device and allow unattended cycling of this device.

NOTE: This test will automatically enter a "COOLING" state when the coil starts to get warm. To cancel this, press the "Enter" (mode) Button 3 times.

NOTE: If the switch matrix has a shorted row or column (the entire row or column is "ON") the entire switch matrix (from the switch tests) is temporarily displayed instead of the trap door. Locate the offending row or column and fix this problem FIRST.

This test is similar in function to the coil test. The different sub-tests can be selected by the "+" or "-" buttons. There are 3 modes to this test (controlled by the ENTER button).

- RUNNING - Automatically cycles through the different sub-tests.
- REPEAT - Remain on the same sub-test.
- STOPPED - Turn off all coils, remain on this sub-test.

Dot Matrix diagram:

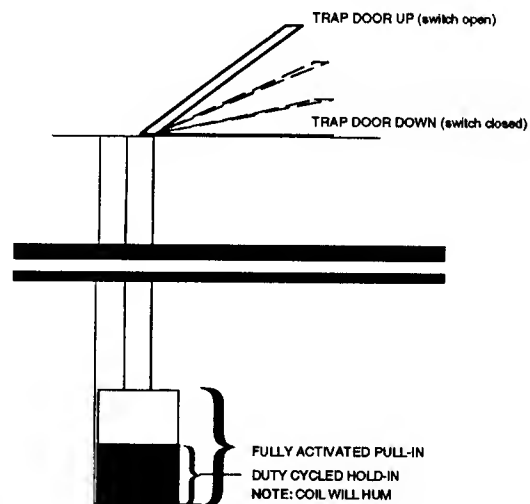
Switches

When "TRAP DOWN" switch is closed, the door will be down.

Coils

When the coil is fully activated (PULL-IN), it is 100% filled.

When the coil duty is cycled (HOLD-IN), it is 50% filled.



TRAP DOOR AS VIEWED FROM DOT MATRIX DISPLAY

T.14 Mini-Playfield Test



*Movement of the mini-playfield can cause **SERIOUS PHYSICAL INJURY**. Keep fingers and loose clothing away from **ALL** moving parts.*

*As a **safety feature**, during normal game play (and attract mode) the mini-playfield will not move unless the coin door is closed and the playfield glass is on. During the mini-playfield test, both flipper buttons must be pressed before it will move.*

When this test is first started a warning message will appear. Pressing the "ENTER" button again confirms that the operator is aware that the high torque motor can cause physical injury. During the test, the operator must press and hold both flipper buttons to allow the mini-playfield to move.

The Dot Matrix display (left side) shows a front view of the Mini-playfield. The top line (right side) identifies the eleven sub-tests. The second line indicates the current test mode. The third line shows the "number of faults" or errors (from the feature audits). *Note, pressing the credit button during this test will clear the fault number (for easier detection of intermittent problems when cycled overnight).* And the fourth line is a status line, showing the current "moving", "kicking", "flashing", or "error" state.

When a switch is considered "active", its area is filled in. A switch is active when it is "closed". An opto is the opposite and is active when the beam is broken, making the switch "open". If all opto switches are abnormally "active" or "open" look for a loss of power, switch column, and opto common wires (for the emitters and receivers).

NOTE: If the switch matrix has a shorted row or column (the entire row or column is "ON") the entire switch matrix (from the switch tests) is temporarily displayed instead of the mini-playfield. Locate the offending row or column and fix this problem **FIRST**.

NOTE: If there are 2 errors with the last 2 complete test cycles, the mode will automatically set itself to "STOPPED" mode. This should prevent any accidental damage to the device.

This test is similar in function to the coil test. The different sub-tests can be selected by the "+" or "-" buttons. There are 3 modes to this test (controlled by the ENTER button).

- | | | |
|---------|---|---|
| RUNNING | - | Automatically cycles through the different sub-tests. |
| REPEAT | - | Remain on the same sub-test. |
| STOPPED | - | Turn off all coils, remain on this sub-test. |

Abbreviations:

C.W. = Clockwise direction

C.C.W. = Counter clockwise direction

Mini. = Mini-playfield

Dot Matrix Diagram:**Switches**

2 Locking Opto Ejects

1 Stand-up Target

5 Opto Targets (middle level of mini-playfield)

3 Door Switches (on ramp)

1 Opto Playfield Position Sensor (bottom of picture, beam broken or transmitted/received)

Coils

2 locking opto ejects (not shown)

1 flasher (not shown)

Motor C.C.W./C.W. (arrow indicates direction of wheel when viewed from front of game)

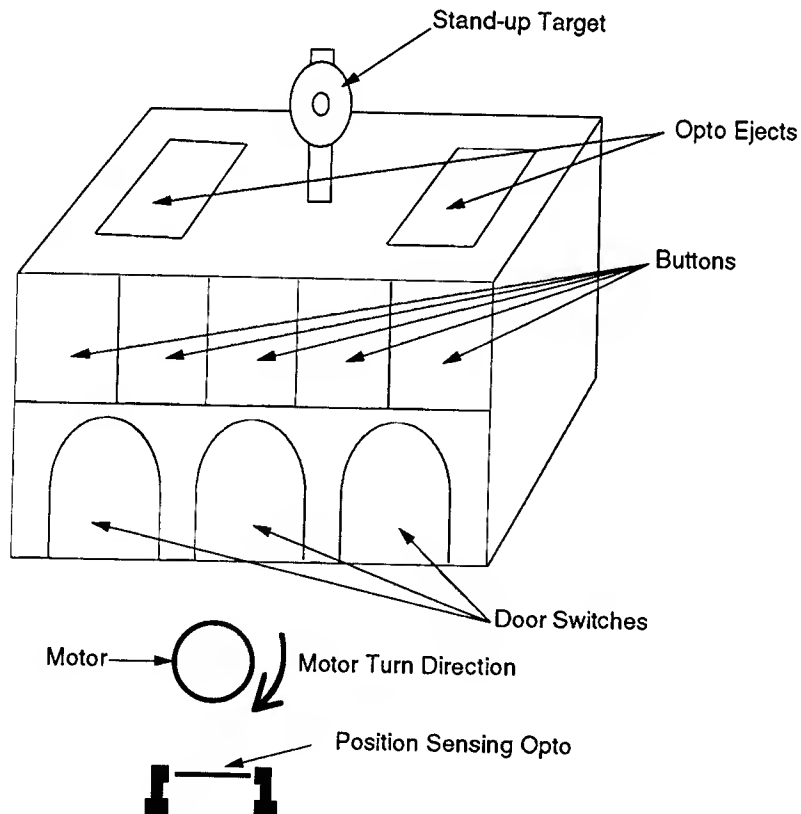
Motor on/off (on = filled in motor picture)

Controlled lamps (not shown on dot matrix display)

2 lock lamps

1 lite lock lamp

3 G.I. lamps (not shown on dot matrix display)



Press the Enter button to activate the Utilities Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Utility Menu selections. Press the Enter button to activate a selection. Use the Up or Down button to rotate the settings. Press the Enter button to lock in a setting. If a mistake is made while changing a setting, press the Escape button while "Saving Adjustment Value" is still in the display. The original setting is retained and the new setting is ignored. Press the Escape button to return to the Utilities Menu. Press it again to return to the Main Menu.

U. UTILITIES MENU

U.1	Clear Audits
U.2	Clear Coins
U.3	Reset H.S.T.D.
U.4	Set Time & Date
U.5	Custom Message
U.6	Set Game I.D.
U.7	Factory Adjustments
U.8	Factory Resets
U.9	Presets
U.10	Clear Credits
U.11	Auto Burn-In

U.1 Clear Audits

Press the Enter button to clear the Standard Audits (except Burn-In Time), Feature Audits, and Histograms.

U.2 Clear Coins

Press the Enter button to clear the Earnings Audits.

U.3 Reset H.S.T.D.

Press the Enter button to clear the High Score to Date Table and the Grand Champion.

U.4 Set Time and Date

Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.5 Custom Message

Set A.1 20 to YES before writing a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once your message is complete, press and hold the Enter button until "Message Stored" is displayed.

Press the Escape button to cancel the new message. The message "Press Enter to Reset" appears. If you press Enter, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

U.6 Set Game I.D.

This utility allows the operator to install a message, such as game location, that only appears on printouts. Press the Enter button to activate Set Game I.D.. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation.

U.7 Factory Adjustment

Press the Enter button to restore the adjustments to factory settings.

U.8 Factory Reset

Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

U.9 Presets

Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.9 01 Install Extra Easy

The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual groups.

U.9 02 Install Easy

Somewhat LESS difficult than factory setting.

U.9 03 Install Medium

About the SAME as factory setting.

U.9 04 Install Hard

Somewhat MORE difficult than factory setting.

U.9 05 Install Extra Hard

MUCH MORE difficult than factory setting.

Game Difficulty Setting Table for U.S./Canadian/French Games

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03	Hard U.0 04	Extra Hard U.9 05
A.2 09	Memory W-H-O Timer	NO	NO	YES	YES	YES
A.2 10	1st W-H-O Timer	14	12	10	09	09
A.2 11	2nd W-H-O Timer	12	10	08	08	07
A.2 12	3rd W-H-O Timer	10	08	07	07	06
A.2 13	Last W-H-O Timer	08	06	06	06	06
A.2 14	Easy Locks for	02	01	01	01	00
A.2 15	Easy 3x5 for	02	01	01	01	00
A.2 16	3 Ball Jackpot/Davros	01	02	02	03	04
A.2 17	2 Ball Jackpot/Davros	02	03	03	04	05
A.2 18	Rematch 1st Ball	15	15	10	08	07
A.2 19	Rematch 2nd Ball	15	10	05	05	05
A.2 20	Rematch Target Add	10	07	05	04	04
A.2 22	R.E.P.A.I.R. 1 Lamp	10	10	10	10	08
A.2 23	R.E.P.A.I.R. 2 Lamps	10	10	09	08	07
A.2 24	R.E.P.A.I.R. 3 Lamps	10	10	08	07	06
A.2 25	R.E.P.A.I.R. 4 Lamps	10	08	07	06	06
A.2 26	R.E.P.A.I.R. 5 Lamps	10	06	06	06	06
A.2 27	R.E.P.A.I.R. All Lamps	10	10	10	10	08
A.2 28	Transmat/Doctor Memory	YES	YES	YES	YES	NO
A.2 29	Transmat Spot Doctor	250,000	500,000	750,000	1,000,000	1,500,000
A.2 30	Memory Doctors 1-7	Add 2	Add 1	Add 1	YES	Forget 1
A.2 31	Pre-lite E.S.C.A.P.E.	02 Lamp	01 Lamp	01 Lamp	NONE	NONE
A.2 32	E.S.C.A.P.E. Target Memory	YES	YES	YES	NO	NO
A.2 33	E.S.C.A.P.E. Bonus Memory	YES	YES	NO	NO	NO
A.2 34	Bonus 'X' Memory	YES	YES	YES	YES	NO
A.2 35	Playfield 'X' Memory	YES	YES	YES	YES	NO
A.2 36	Playfield, 1.5X	10	11	10	09	10
A.2 37	Playfield, 2.0X	10	10	09	08	09
A.2 38	Playfield, 2.5X	10	09	08	07	08
A.2 39	Playfield, 3.0X	10	08	07	06	07
A.2 40	Playfield, 3.5X	10	07	06	06	06
A.2 41	Playfield, 4.0X	10	11	10	10	10
A.2 44	Video Mode Lit	Ball Start	Game Start	Not Lit	Not Lit	Not Lit
A.2 45	Video Mode ESCAPE Relit	YES	YES	YES	YES	NO
A.2 46	Video Mode Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard

Game Difficulty Setting Table for German/European Games

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.0 03	Hard U.9 04	Extra Hard U.9 05
A.2 09	Memory W-H-O Timer	NO	YES	YES	YES	YES
A.2 10	1st W-H-O Timer	14	10	09	09	09
A.2 11	2nd W-H-O Timer	12	08	08	07	06
A.2 12	3rd W-H-O Timer	10	07	07	06	06
A.2 13	Last W-H-O Timer	08	06	06	06	06
A.2 14	Easy Locks for	02	01	01	00	00
A.2 15	Easy 3x5 for	02	01	01	00	00
A.2 16	3 Ball Jackpot/Davros	01	02	03	04	05
A.2 17	2 Ball Jackpot/Davros	02	03	04	05	06
A.2 18	Rematch 1st Ball	15	10	08	07	05
A.2 19	Rematch 2nd Ball	15	05	05	05	05
A.2 20	Rematch Target Add	10	05	04	04	03
A.2 22	R.E.P.A.I.R. 1 Lamp	10	10	10	08	07
A.2 23	R.E.P.A.I.R. 2 Lamps	10	09	08	07	05
A.2 24	R.E.P.A.I.R. 3 Lamps	10	08	07	06	05
A.2 25	R.E.P.A.I.R. 4 Lamps	10	07	06	06	05
A.2 26	R.E.P.A.I.R. 5 Lamps	10	06	06	06	05
A.2 27	R.E.P.A.I.R. All Lamps	10	10	10	08	07
A.2 28	Transmat/Doctor Memory	YES	YES	YES	NO	NO
A.2 29	Transmat Spot Doctor	250,000	750,000	1,000,000	1,500,000	2,000,000
A.2 30	Memory Doctors 1-7	Add 2	Add 1	YES	Forget 1	Forget 2
A.2 31	Pre-lite E.S.C.A.P.E.	02 Lamp	01 Lamp	None	None	None
A.2 32	E.S.C.A.P.E. Target Memory	YES	YES	NO	NO	NO
A.2 33	E.S.C.A.P.E. Bonus Memory	YES	NO	NO	NO	NO
A.2 34	Bonus 'X' Memory	YES	YES	YES	NO	NO
A.2 35	Playfield 'X' Memory	YES	YES	YES	NO	NO
A.2 36	Playfield, 1.5X	10	10	09	10	09
A.2 37	Playfield, 2.0X	10	09	08	09	08
A.2 38	Playfield, 2.5X	10	08	07	08	07
A.2 39	Playfield, 3.0X	10	07	06	07	06
A.2 40	Playfield, 3.5X	10	06	06	06	06
A.2 41	Playfield, 4.0X	10	10	10	10	10
A.2 44	Video Mode Lit	Ball Start	Not Lit	Not Lit	Not Lit	Not Lit
A.2 45	Video Mode ESCAPE Relit	YES	YES	YES	NO	NO
A.2 46	Video Mode Difficulty	Extra Easy	Medium	Hard	Extra Hard	Extra Hard

U.9 06 Install 5 Ball**U.9 07 Install 3 Ball**

Adjustments U.9 06 and U.9 07 can be used to change a game to 3 or 5 ball play, including the changing of certain features to the recommended 3- and 5-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

Preset Game Adjustments Table for U.S./Canadian Games

Adjustment Number	Adjustment Description	Install 5-Ball U.9 06	Install 3 Ball U.9 07
U.9 03	Install Medium	Not Used	YES
U.9 04	Install Hard	YES	Not Used

U.9 08 Install Add-A-Ball

This option deletes all Free Play awards and replace them with Extra Ball awards. Individual adjustments are affected, as follows:

<u>Adjustment</u>	<u>Name</u>	<u>New Setting</u>
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Extra Ball
A.1 15	Special Award	Extra Ball
A.1 17	Extra Ball Ticket	No
A.1 19	Match Feature	Off
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 08	High Score 3 Credits	00
A.4 07	High Score 4 Credits	00

U.9 09 Install Ticket

This option deletes Credit awards and replace them with Ticket awards. Individual adjustments are affected, as follows:

<u>Adjustment</u>	<u>Name</u>	<u>New Setting</u>
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Extra Ball Ticket	Yes
A.1 31	Ticket Expansion Board	Yes
A.4 02	H.S.T.D. Award	Ticket

U.9 1 0 Install Novelty

This option removes all Free Play and Extra Ball awards. Individual adjustments are affected, as follows:

<u>Adjustment</u>	<u>Name</u>	<u>New Setting</u>
A.1 04	Max. Extra Ball	Off
A.1 05	Replay System	Fixed
A.1 09	Replay Level 1	Off
A.1 10	Replay Level 2	Off
A.1 11	Replay Level 3	Off
A.1 12	Replay Level 4	Off
A.1 15	Special Award	Points
A.1 19	Match Feature	Off
A.4 01	Highest Score	On
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

U.9 1 1 Install Buy-in

This option automatically sets game pricing to 1 for 50¢/2 for \$1.00, and 1 Coin Buy-in (A.3 19) to YES.

U.9 1 2 Not Used

U.9 1 3 Not Used

U.9 1 4 Not Used

U.9 1 5 Not Used

U.9 1 6 Not Used

- U.9 17 Install German 1•
- U.9 18 Install German 2•
- U.9 19 Install German 3•
- U.9 20 Install German 4•
- U.9 21 Install German 5•
- U.9 22 Install German 6•

Adjustments U.9 17 through U9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. **NOTE:** German Replay starts at 50,000,000.

Preset Game Adjustments Table for German/European Games

Adj. #	Adj. Description	German 1 U.9 17	German 2 U.9 18	German 3 U.9 19	German 4 U.9 20	German 5 U.9 21	German 6 U.9 22
A.1 14	Replay Award	Credit	Ticket	Audit	Credit	Ticket	Audit
A.1 15	Special Award	Credit	Extra Ball	Points	Credit	Extra Ball	Points
A.1 15	Match Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.1 19	Match Feature	7%	7%	Off	7%	7%	Off
A.3 01	Game Pricing	6 spiele/5 DM	6 spiele/5 DM	6 spiele/5 DM	7 spiele/5 DM	7 spiele/5 DM	7 spiele/5 DM
A.4 02	H.S.T.D. Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.4 04	Champion Credits	03	03	00	03	03	00
A.4 05	High Score 1 Credits	01	01	00	01	01	00
A.4 06	High Score 2 Credits	00	00	00	00	00	00
A.4 07	High Score 3 Credits	00	00	00	00	00	00
A.4 08	High Score 4 Credits	00	00	00	00	00	00
A.4 10	Backup Champion	500,000,000	500,000,000	00	500,000,000	500,000,000	00
A.4 11	Backup High Score 1	450,000,000	450,000,000	00	450,000,000	450,000,000	00
A.4 12	Backup High Score 2	400,000,000	400,000,000	00	400,000,000	400,000,000	00
A.4 13	Backup High Score 3	350,000,000	350,000,000	00	350,000,000	350,000,000	00
A.4 14	Backup High Score 4	300,000,000	300,000,000	00	300,000,000	300,000,000	00

• For German Jumpered CPU Boards only. German Jumpers are:

W14	W15	W16	W17	W18
In	In	In	In	Out

- U.9 23 Install French 1*
- U.9 24 Install French 2*
- U.9 25 Install French 3*
- U.9 26 Install French 4*
- U.9 27 Install French 5*
- U.9 28 Install French 6*

Adjustments U.9 23 through U.9 26 are used to modify game pricing and type of play. The Preset Game Adjustments Table for French Games lists the adjustments and settings that comprise the individual groups.

Preset Game Adjustments Table for French Games

Adj. #	Adjustment Description	French 1 U.9 23	French 2 U.9 24	French 3 U.9 25	French 4 U.9 26	French 5 U.9 27	French 6 U.9 28
U.9 06	Install 5 Ball	N/A	N/A	N/A	N/A	N/A	Yes
A.2 03	Video Mode Auto. Extra Ball	10%	7%	12%	12%	10%	10%
A.2 05	WHO Auto. Extra Ball	10%	7%	12%	12%	10%	10%

*For French Jumpered CPU Boards only. French Jumpers are:

W14	W15	W16	W17	W18
In	In	In	Out	In

U.10 Clear Credits

Press the Enter button to clear the game Credits.

U.11 Auto Burn-in

Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This will help in find intermittent problems. The tests that Auto Burn-in cycle through are: the Display Test, Sound and Music Test, All Lamps Test, Solenoid Test, Flashers Test, General Illumination Test, and the Flipper Coil Test. All of the tests are run concurrently. The time spent on the current burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Enter button to activate the Adjustments Menu, once the menu name is shown under the Main Menu. Press the Up or Down button to cycle through the Adjustment Menu selections. Press the Enter button to activate the selection. Press the Up or Down button to cycle through the available adjustments. Press the Enter button to activate an adjustment. When an adjustment is activated, the setting value begins to flash. Use the Up or Down button to raise or lower the setting value. Press Enter to lock in the value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained. Press the Enter button to return to the Adjustments Menu. Press it again to return to the Main Menu.

A. ADJUSTMENTS MENU

- A.1 Standard Adjustments**
- A.2 Feature Adjustments**
- A.3 Pricing Adjustments**
- A.4 H.S.T.D Adjustments**
- A.5 Printer Adjustments (optional board required)**

A.1 Standard Adjustments

A.1 01 Balls Per Game

A "game" is defined by specifying the number of balls to be played.

Range: 1-10

A.1 02 Tilt Warnings

The number of total actuations of the plumb bob mechanism that can occur before the game is "tilted".

Range: 1-10

A.1 03 Maximum Extra Balls

The number of extra balls that a player may accumulate.

Range: 1-10

A.1 04 Maximum Extra Balls/Ball in Play

The number of extra balls to be awarded per ball in play.

OFF	-	No maximum number of Extra Balls per ball in play.
1-10	-	1 through 10 Extra Balls per ball in play.

A.1 05 Replay System

The type of replay system to be used.

Fixed	-	Replay value is set and does not change during game play.
Auto%	-	Replay starting value is set and changes every 50 games to comply with the percentage of replays desired.

A.1 06 Replay Percent*

The percentage of replays the players are able to earn when Auto Replay is used.

Range: 5-50%

A.1 07 Replay Start*

The replay start value when Auto% Replay is used. The range of this setting is 1, 000, 000 to 20, 000, 000.

A.1 08 Replay Levels*

The number of replay levels used by the Auto% Replay mode. The range of this setting is 1 to 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level value. When three of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

*For Auto % Replay.

A.1 09 Replay Level 1

A.1 10 Replay Level 2

A.1 11 Replay Level 3

A.1 12 Replay Level 4

The values used for the 1st through 4th levels of Fixed Replay. Range: 00 - 25,000,000.

A.1 13 Replay Boost

The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is canceled when credits equal 0, the player inserts another coin, or Begin Test is pressed.

ON - Score is boosted between 500, 000 and 5, 000, 000 points.
OFF - Replay score is not boosted.

A.1 14 Replay Award

For the form of award automatically provided when the player exceeds any replay level for either Auto% Replay, or Fixed Replay.

Credit - Reaching each Replay level awards credit.
Ticket - Reaching each Replay level awards a ticket.
Ball - Reaching each Replay level awards an Extra Ball.
Audit - Reaching each Replay level awards nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards.

A.1 15 Special Award

The award automatically provided when the player scores a special.

Credit - Scoring a Special awards a Credit.
Ticket - Scoring a Special awards a Ticket.
Ball - Scoring a Special awards an Extra Ball.
Points - Scoring a Special awards 1 Million points.

A.1 16 Match Award

The award automatically provided when the players wins a match.

Credit - Winning a Match awards a Credit.
Ticket - Winning a Match awards a Ticket.

A.1 17 Extra Ball Ticket

A Ticket is awarded when the player earns an Extra Ball.

YES - The player is awarded a Ticket in addition to an Extra Ball.
NO - The player is not awarded a Ticket.

A.1 18 Maximum Ticket/Player

The amount of Tickets each player can earn.
Range 00 - 100

A.1 19 Match Feature

The desired percentage for the Match Feature occurring at the end of the game.

OFF - Match Feature is not available.
1 -50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A matching of these two digits results in an award of a Credit or a Ticket.

A.1 20 Custom Message

The message displayed during the Attract Mode.

YES - A message is displayed
NO - A message is not displayed.

A.1 21 Language

The language the game uses: English, French, or German.

A.1 22 Clock Style

The style of clock the game uses: A.M./P.M., or 24 Hours.

A.1 23 Date Style

The style of date the game uses: Month/Date/Year, or Date/Month/Year.

A.1 24 Show Date and Time

The date and time show in the Attract Mode.

YES - Show date and time in status report, or Attract Mode.
NO - Do Not show date and time in status report or Attract Mode.

A.1 25 Allow Dim Illumination

The game program dims the General Illumination for special effects during the Attract Mode.

YES - Dim General Illumination during Attract Mode.
NO - Do Not dim General Illumination.

A.1 26 Tournament Play

Equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player).

YES - Keep Multi-ball and Jackpots equal.
NO - Do Not Keep Multi-ball and Jackpots equal.

A.1 27 Euro. Scr. Format

Use either commas or dots between digits when numbers are displayed.

YES - Dots instead of commas, (example 1.000.000).
NO - Commas instead of dots, (example 1,000,000).

A.1 28 Minimum Volume Control

The volume can be turned Off.

YES - Volume can be turned Off.
NO - Volume can be turned Down but not Off.

A.1 29 General Illumination Power Saver

This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines how dimness of lamps. Using this feature will substantially increase the life of the lamps.

Setting: - Off, 2-60 Minutes

A.1 30 Power Saver Level

When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

Range: 4-7

A.1 31 Ticket Expansion Board

When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch, and manual ticket dispense switch.

Yes - Ticket Expansion Board is connected.
No - Ticket Expansion Board is NOT installed in the game.

A.1 32 No Bonus Flips

The activation of flippers during the end of ball "bonus" sequence. Setting this to "YES" may extend the life of the flipper mechanisms.

A.1 33 Game Restart

When the start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin. This adjustment has 3 settings to determine how this is handled.

Never: - Do not allow a new game to start until the current game is over.

Slow: - Restart if the start button is pressed continuously for over 1/2 second.
This helps to prevent the unintended restart of game in progress.

Instantly: - Restart as soon as the start button is pressed.

When the start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

A.2 Feature Adjustments

A.2 01 Ball Time

This is the desired ball time for this game. The game will award more features to the players that are under this time.

Settings: OFF = Do not use this.
 1-99 = Desired ball time.

A.2 02 Automatic % Special And Match

Auto-adjust specials through the "Percent Match Awards" (A.1 19). When this is set to YES, the special AND match awards are regulated by adjustment "Percent Match Awards" (A.2 19).

Settings: YES = Auto-adjust specials and match to A.1 19 percent.
 NO = Do not Auto-adjust special.

A.2 03 Video Mode Automatic Extra Ball

This will Auto-adjust the award of extra ball for video mode. *Note:* Since this is a skill shot, it will pick the first wave that does NOT exceed this percentage per game. When active it will change the next adjustment. *Note:* If the next adjust is "none", auto-adjust will NOT change it.

Settings: OFF = Do not auto-adjust the next adjustment.
 1-99%= Auto-adjust awarding extra ball to this percentage per game.

A.2 04 Video Mode Extra Ball

This controls which video mode wave the extra ball "sign" appears. When auto-adjusted by A.2 03, this is the current setting being used.

Settings: NONE = No extra ball is offered in video mode.
 1-25 = Wave number for extra ball.

A.2 05 Automatic Extra Ball Lit

This will Auto-adjust the lighting of Extra Ball awards at or below this percentage per game. This is done by changing the next two game adjustments.

Settings: OFF = Do not Auto-adjust the next two settings.
 1-99 = Auto-adjust Lighting Extra Ball to this percentage per game.

A.2 06 1st Extra Ball Lit

Completing the sequence W-H-O this many times will light an extra ball lamp. (Note, disabling extra ball is done by A.1 03 or A.1 04 adjustments). When this is auto-adjusted by A.2 03, this is the current setting being used.

Settings: 1 - 50 W-H-O's

A.2 07 Next Extra Ball Lit

Completing the sequence W-H-O this many times after extra ball has been lit will light an extra ball lamp. The next takes twice as long, the third takes three times as long, etc. (Note, disabling extra ball is done by A.1 03 or A.1 04). When this is auto-adjusted by A.2 03, this is the current setting being used.

Settings: +1 - +50 W-H-O's

A.2 08 Memory Extra Ball

This controls what lamps will be turned off at the start of a ball for the extra ball lamps on the outlane and return lanes.

Settings: NO = All lamps are turned off at ball start.
YES = Lamps remain on at the start of a ball.
FORGET 1 = Turn 1 lamp off at the start of a ball.
FORGET 2 = Turn 2 lamps off at the start of a ball.
FORGET 3 = Turn 3 lamps off at the start of a ball.

A.2 09 Memory W-H-O Timer

This controls which W-H-O timer (next 4 adjustments) to use at the start of a ball.

Settings: NO = Use the "1st W-H-O Timer" at the start of a ball.
YES = Continue using the current W-H-O timer.

A.2 10 1st W-H-O Timer

A.2 11 2nd W-H-O Timer

A.2 12 3rd W-H-O Timer

A.2 13 Last W-H-O Timer

This controls how fast the W-H-O timed sequence shots time down. The 1st W-H-O timer is for the 1st completion of W-H-O, etc.

Setting 2-50 seconds.

A.2 14 Easy Locks for...

This controls how hard the locks are for jackpot, located on the "Time Expander" mini-playfield. Hard locks first require hitting the middle mini-playfield "Lite Lock" target before locks are lit.

Setting Jackpot 0 - Start the locks hard for the 1st Jackpot.
Jackpot 1-50 - Start easy for these Jackpots.

A.2 15 Easy 3x5 for...

This controls how hard it is to complete the 3x5 "Time Expander" mini-playfield lamps. An easy setting will spot 2 lamps on the 3x5 matrix for every 1 target hit.

Setting Jackpot 0 - Start the 3x5 hard for the 1st Jackpot.
Jackpot 1-50 - Start the 3x5 easy for these Jackpots.

A.2 16 3 Ball Jackpot/Davros

A.2 17 2 Ball Jackpot/Davros

This controls how many Jackpots are required before reaching the Davros Jackpot (a super jackpot). We recommend that 2 Ball Jackpots be higher than 3 Ball Jackpots, because obtaining a 2 Ball Jackpot is easier than a 3 Ball Jackpot. Also, during the game, if a player gets closer to the Davros Jackpot during 2 Ball Multiball, the 3 Ball Jackpot will be the same as a 2 Ball Jackpot.

Setting 0 to 12 - Number of jackpot awards before reaching the Davros Jackpot.

A.2 18 Rematch 1st Ball

A.2 19 Rematch 2nd Ball

After multiball, and if the player has NOT obtained a jackpot, the player is allowed to lock 1 or 2 balls for Instant Multiball again. These are the times allowed to re-lock a ball.

Setting: 1-50 Seconds.

A.2 20 Rematch Target Add

During the allowed time for instant multiball (see above), the "Time Expanders" mini-playfield center target will add this amount of time to the current time left.

Setting: OFF = Do not effect instant multiball timers.
1-50 Seconds = Add this amount of time to the timers.

A.2 21 Game Over Unlock

This controls if the next player can have balls left in the locks. A player must still "earn" their locks by hitting the "Time Expanders" mini-playfield middle target.

Setting: NO = Keep the balls locked between games.
YES = Unlock any locked balls at game over.

A.2 22 R.E.P.A.I.R 1 Lamp

A.2 23 R.E.P.A.I.R 2 Lamps

A.2 24 R.E.P.A.I.R 3 Lamps

A.2 25 R.E.P.A.I.R 4 Lamps

A.2 26 R.E.P.A.I.R 5 Lamps

A.2 27 R.E.P.A.I.R All Lamps

This is the amount of time that the R.E.P.A.I.R lamps remain on per number of lamps lit, then the entire string of lamps is turned off. When all lamps are on, unlimited million (from hitting any target) is awarded. We recommend that the times should be the same or higher than the next adjustment.

Settings: 1-50 Seconds.

A.2 28 Transmat/Doctor Memory

This controls the "AWARD TRANSMAT" lamp at the start of a ball. It effects how many additional Doctors can be added to the play of a game.

Setting: YES = Lamp remains in its current state.
NO = Lamp is turned off at the start of a ball.

A.2 29 Transmat Spot Doctor

This controls the threshold score needed to add another doctor to the playfield by the "AWARD TRANSMAT" target.

Setting: 0 = Add another doctor after 1st hit of jet bumpers.
50,000 to 2 million = Threshold score to reach before adding another doctor.

A.2 30 Memory Doctors 1-7

This controls what lamps will be turned off at the start of a ball for the 7 Doctor lamps. Each lamp represents making an area of the playfield easier to Award or Score.

Setting: NO = All lamps are turned off at ball start.
YES = Lamps remain on at the start of a ball.
FORGET 1 = Turn 1 lamp off at the start of a ball.
FORGET 2 = Turn 2 lamps off at the start of a ball.
FORGET 3 = Turn 3 lamps off at the start of a ball.
ADD 1 = Turns 1 additional lamp.
ADD 2 = Turns 2 additional lamps.
ADD 3 = Turns 3 additional lamps.

A.2 31 Pre-lite E.S.C.A.P.E.

This controls how easy the special is to award. This is done by pre-lighting the ESCAPE bonus lamps, the last (5th) lamp is the SPECIAL award lamp.

Settings: None = Start with all lamps off at game start.
1-4 Lamps = Start with 1 to 4 lamps on.

A.2 32 E.S.C.A.P.E. Target Memory

This controls the individual "E.S.C.A.P.E." target lamps at the start of a ball. It effects the award of the Special.

Setting: YES = Lamps remain in their current state.
NO = Lamps are turned off at the start of a ball.

A.2 33 E.S.C.A.P.E. Bonus Memory

This controls the bonus lamps when completing the "ESCAPE" targets at the start of a ball. It effects the award of the Special.

Settings: YES = Lamps remain in their current state.
NO = Lamps are turned off at the start of a ball.

A.2 34 Bonus 'X' Memory

This controls the value of the outhole bonus multiplier at the start of a ball.

Setting: YES = Multiplier remains at its current value.
NO = Multiplier starts at 1X at the start of a ball.

A.2 35 Playfield 'X' Memory

This controls what lamps will be turned off at the start of a ball for the playfield multiplier and playfield unlimited million.

Setting: NO = All lamps are turned off at ball start.
YES = Lamps remain on at the start of a ball.
FORGET 1 = Turn 1 lamp off at the start of a ball.
FORGET 2 = Turn 2 lamps off at the start of a ball.
FORGET 3 = Turn 3 lamps off at the start of a ball.

A.2 36 Playfield, 1.5X

A.2 37 Playfield, 2.0X

A.2 38 Playfield, 2.5X

A.2 39 Playfield, 3.0X

A.2 40 Playfield, 3.5X

A.2 41 Playfield, 4.0X

This is the amount of time that the playfield multiplier lamps remain on per multiplier. When this multiplier has timed down the next lower multiplier starts to time down. When all lamps are on, the playfield unlimited million is awarded. We recommend that the times should be the same or lower than the previous adjustment, except for the 4.0X which should be higher or the same as the 3.5X adjustment.

Settings: 2-50 Seconds.

A.2 42 Hang On Time

This is the amount of time that the "HANG ON" lamp is lit. It is lit by the right return lane and collected by the upper left flipper shot.

Settings: OFF = Lamp is lit until the end of a ball.
1-50 Seconds = Amount of time to leave lamp on.

A.2 43 Second Chance

After ball start, this is the amount of time that the "SECOND CHANGE" lamp is lit. It allows players who drain within this time to be served another ball.

Settings: OFF = There is NO second change.
1-50 Seconds = Minimum amount of time for ball to be on playfield.

A.2 44 Video Mode Lit

This selects alternative methods of lighting the video mode lamp, besides the normal completion of ESCAPE.

Settings: GAME START, BALL START, and NOT LIT.

A.2 45 Video Mode ESCAPE Relit

This allows the video mode lamp to be relit when the player plays video mode and successfully completes (escapes) video mode.

Settings: YES = Re-lites video mode when player successfully escapes video mode.
NO = Does not re-lite video mode when player successfully escapes video mode.

A.2 46 Video Mode Difficulty

This selects how difficult video mode is at the start of a game.

Settings: Extra Easy, Easy, Medium, Hard, and Extra Hard.

A.2 47 Mini-playfield

Set to DISABLED to stop the operation of the "Time Expander" mini-playfield. When set to DISABLED, lower the mini-playfield all the way down to continue operation of the game.

Settings: ENABLED, or DISABLED.

A.2 48 Trap Door

Set to DISABLED to stop the operation of the Trap Door. When "DISABLED", the door should be "open" so that the ball falls to the upper left flipper.

Settings: ENABLED, or DISABLED.

A.2 49 Not Used**A.2 50 Attract Mode Sounds**

This allows the game to make sounds, during the attract mode (game over), on a regular basis.

Settings: ALOT = After a game is played it will make alot of sounds.
 SOME = After a game is played it will make 10 sounds.
 NONE = After a game is played it will make no sound.

A.2 51 Fancy Attract Mode G.I.

When set to "YES", it allows the attract mode to blink the General Illumination lamps in an effect to attract more players. When set to "NO", the General Illumination lamps are just left ON.

A.2 52 Timed Plunger

This is the time allowed for a player to hit the plunger switch (or the "launch ball" switch) to start a ball. Then this time is exceeded, the ball is automatically launched.

Settings: OFF = Do not automatically launch the ball.
 5-120 seconds = Time allowed before ball is automatically launched.

A.2 53 Flipper Plunger

If the "launch ball" switch is malfunctioning, set this adjustment to "YES" to use the left flipper to fire the plunger. Normally, the software tries to detect a malfunctioning "launch ball" switch and will automatically use the left flipper to launch a ball. Also, the plumb-bob tilts' first switch hit will also launch a ball.

Settings: NO = Do not use left flipper to launch a ball.
 YES = Use the left flipper to launch a ball.

A.3 Pricing Adjustments

A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)

The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.

A.3 02 Left Coin Units

A.3 03 Center Coin Units

A.3 04 Right Coin Units

A.3 05 4th Slot Units

The number of coin units purchased by a coin passing through the left, right, center, and fourth coin chutes.

A.3 06 Units/Credits

Defines the number of coin units required to obtain 1 credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of these coin units exceeds or matches the Unit per Credit value by a multiple (or more, coin units) of the specified Units per Credit value the Credits display shows the proper number of credits. The coin unit counter retains any remaining coin units, until the start of Ball 2; then the coin unit counter is cleared (its contents are zeroed).

A.3 07 Units/Bonus

Additional credits are to be indicated in the credits display, when a certain number of coin units are accumulated.

A.3 08 Bonus Credits

The number of credits that are awarded when the Units/Bonus level is achieved.

A.3 09 Minimum Units

No credits are to be posted (indicated in the credit display), until the credits unit counter reaches a particular value, by setting this value to 02 (or more).

A.3 10 Coin Door Type (if set to custom, then 11 to 15 are available)

This adjustment is used to preset adjustments 11 through 15, based on standard coin doors (U.S.A., German, Etc.).

A.3 11 Collection Text

The coin system used to display the Earning Audits.

A.3 12 Left Slot Value

A.3 13 Center Slot Value

A.3 14 Right Slot Value

A.3 15 4th Slot Value

The monetary value of the left, center, right, and 4th coin chutes.

A.3 16 Maximum Credits

The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 10. Reaching the specified setting prevents the award of any credits.

A.3 17 Free Play

The player can operate the game without a coin (free play) or with a coin.

NO	-	A coin is necessary for game play.
YES	-	Game play is free; no coin required.

A.3 18 Hide Coin Audits

The coin audits may, or may not be displayed.

YES	-	The coin audits are not displayed.
NO	-	The coin audits are displayed.
HIDE NAMES	-	The coin audit value is shown but not the audit name.

A.3 19 1 Coin Buy-in

If game pricing is set to 1 for 50¢/2 for \$1.00 the player is allowed to 'buy-in' a subsequent game for 1 coin. The number of games that may be purchased at this cost is determined by the number of players in the previous game; that is, if the previous game had three players, 3 Credits can be purchased at the rate of 1 coin per credit.

YES	-	The player has 10 seconds to buy-in at 1 coin per game.
NO	-	The buy-in feature is disabled.

A.3 20 Base Coin Size

The number of ticket per coin calculations.

A.3 21 Coin Meter Units

It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00".

Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.

A.3 22 Dollar Bill Slot

The system normally requires 150 microseconds between coin pulses. This is too long a delay for a fast-pulsing dollar bill validator. This adjustment may be used to tell the game that there is a fast pulsing dollar bill validator connected to one of the coin switches. The options are:

NONE	=	No validator connected.
LEFT	=	Validator connected to left slot.
CENTER	=	Validator connected to center slot.
RIGHT	=	Validator connected to right slot.
FOURTH	=	Validator connected to fourth slot.

A.3 23 Minimum Coin Microseconds

This is the minimum width required for coin pulses to be accepted as valid coins. This may be changed to prevent certain kinds of cheating.

Pricing Table

Country	Coin Chute				Games/Coin	Display	Pricing Adjustments A.3
	Left	Center	Right	4th			02 03 04 05 06 07 08 09
USA	25¢	*\$1.00	25¢	-	1/25¢, 4/\$1 ² 1/50¢, 2/75¢, 3/\$1 ^{1,2} 1/50¢, 2/\$1 ² 1/25¢, 3/\$1 ² 1/25¢, 3/50¢, 6/\$1 1/25¢, 5/\$1	U.S.A. 4/\$1.00 50-75-1.00 U.S.A. 2/\$1.00 U.S.A. 3/\$1.00 CUSTOM CUSTOM	01 04 01 00 01 02 01 00 01 00 01 00 01 04 01 00
Canada	25¢	-	\$1.00	-	1/50¢, 2/75¢, 3/\$1 ² 1/50¢, 2/\$1 ²	CANADA 1 CANADA 2	
Austria	5 Sch	10 Sch	10 Sch	-	1/2x5 Sch, 3/2x10 Sch ² 2/5 Sch, 5/10 Schilling	AUSTRIA CUSTOM	02 00 05 00 01 00 01 00
Australia	20¢	\$1	\$1	\$2	1/\$1, 3/\$2 ²	AUSTRALIA	
United Kingdom	£1.00	50 P	-	20 P	1/3x10P, 2/50P, 4/£1.00, 4/5x20P	U. KINGDOM	
Switzerland	1 Fr	2 Fr	5 Fr	-	1/1 Fr, 3/2 Fr, 7/5 Franc ²	SWISS	
Belgium	5 Fr	20 Fr	50 Fr	-	1/4 x 5F, 1/20 F, 3/50 Franc ²	BELGIUM	
West Germany	1DM	2DM	5DM	-	1/1 DM, 2/2 DM, 7/5 DMark ² 1/1 DM, 2/2 DM, 6/5 DM ^{1,2} 1/1 DM, 3/2 DM, 9/5 DM 1/2x1 DM, 1/2 DM, 3/5 DM 2/1 DM, 5/2 DM, 14/5 DM	GER. 7/6 DM GER. 6/5 DM CUSTOM CUSTOM CUSTOM	09 18 45 00 05 00 01 00 03 06 15 00 05 00 01 00 13 26 65 00 05 65 01 00
Netherlands	1HFI	2.5HFI	2.5HFI	-	1/1 HFI, 3/2.5 Holland Floon ² 1/25¢, 5/1 Guilder 1/1 Guilder ²	NETHERLAND CUSTOM HOLLAND	01 00 05 00 01 00 01 00
Sweden	5 Kr	5 Kr	5 Kr	-	1/5 Krona ²	SWEDEN	
France	1 Fr	5 Fr	10 Fr	-	1/3x1 F, 2/5 F, 5/10 Franc ^{2,3} 1/2x1 F, 3/5 F, 7/10 Franc ^{2,3} 1/5 F, 3/10 F, 7/2x10 Franc ^{2,3} 2/5 F, 4/10 F, 9/2x10 Franc ^{1,2,3} 2/5 F, 5/10 F, 11/2x10 Franc ^{2,3} 1/5 F, 3/10 Franc ^{2,3}	TARIF 1 TARIF 2 TARIF 3 TARIF 4 TARIF 5 TARIF 6	
Italy	500L	500L	500L	-	1/500 Lire ²	ITALY	
Spain	100 P	-	500 P	-	1/100 P, 6/500 Peseta ² 1/25 P, 5/100 Peseta 1/25 P, 4/100 Peseta 1/2x25 P, 2/100 Peseta 1/25x25 P, 3/100 Peseta	SPAIN CUSTOM CUSTOM CUSTOM CUSTOM	01 00 04 00 01 04 01 00 01 00 04 00 01 00 01 00 01 00 04 00 02 00 01 00 03 00 12 00 04 00 01 06
Japan	100 ¥	-	100 ¥	-	1/100 Yen ²	JAPAN	
Chile	Token	-	Token	-	1/1 Token ²	CHILE	
Denmark	1 Kr	5 Kr	10 Kr	-	1/2x1 Kr, 3/5 Kr, 7/10 Krone ²	DENMARK	
Finland	1Mka	-	5 Mka	-	1/2x1 Mka, 3/5 Markka ²	FINLAND	
New Zealand	\$1.00	-	\$2.00	-	1/\$1.00, 3/\$2.00 1/3x20¢ ²	NEW ZEALAND CUSTOM	01 00 01 0 03 00 00 01
Norway	5 Kr	-	10 Kr	-	1/5 Kr, 2/10 Kr, 5/20 Krone ²	NORWAY	
Argentina	10 ¢	10¢	10¢	-	1/1 Token ²	ARGENTINA	
Greece	10 D	20 D	50 D	-	1/2x10D, 1/20D, 3/50 Drachma ²	GREECE	

NOTES: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.
* Only if center coin chute and dollar bill acceptor are available.

A.4 H.S.T.D. Adjustments

A.4 01 Highest Scores

The game maintains a record of the four highest scores achieved to date

- OFF - No high scores are recorded, or displayed.
- ON - The four highest scores are stored in memory and displayed in the Attract Mode.

A.4 02 H.S.T.D. Award

The award given for achieving the High Score To Date, or the Champion H.S.T.D. Credit or Ticket.

A.4 03 Champion H.S.T.D.

The "Highest" High Score is displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs

- ON - The "Highest" High Score is retained in memory and is displayed
- OFF - The "Highest" High Score is not retained

A.4 04 Champion Credits

The operator chooses the number of credits or tickets awarded for a Grand Champion Score. Range: 00 - 10.

A.4 05 H.S.T.D. 1 Credits

A.4 06 H.S.T.D. 2 Credits

A.4 07 H.S.T.D. 3 Credits

A.4 08 H.S.T.D. 4 Credits

The number of credits or tickets to be awarded whenever a player exceeds the 1st, 2nd, 3rd, and 4th highest scores. Range: 00 - 10

A.4 09 High Score Reset Every

The number of games to be played before an automatic reset of the displayed "Highest Score" occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores. Range: OFF (disabled); 250 to 20,000.

A.4 10 Backup Champion

The Back-up Grand Champion Score. Range: 00 - 99,900,000.

A.4 11 Backup H.S.T.D. 1

A.4 12 Backup H.S.T.D. 2

A.4 13 Backup H.S.T.D. 3

A.4 14 Backup H.S.T.D. 4

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached. Range: 00 - 99,900,000.

A.5 Printer Adjustments (optional board required)

A.5 01 Column Width

The column width to be printed Range: 22 - 80.

A.5 02 Lines Per Page

The amount of lines per page. Range: 20 - 80

A.5 03 Pause Every Page

Choose whether the printer pauses at the end of a page

YES	-	The printer does pause
NO	-	The printer does not pause.

A.5 04 Printer Type

Select the type of printer Choices Parallel, Serial, or ADP

A.5 05 Serial Baud Rate

The baud rate used for Serial or ADP communications (bit rate). Choices 300, 600, 1200, 2400, 4800, or 9600.

A.5 06 Serial D.T.R. (Data Terminal Ready)

When a Serial Printer is used, this line may be connected to a printer output line signaling that the printer is busy.

Normal	-	Normal D T.R. signal goes low to indicate the printer is not ready.
Inverted	-	Inverted D T.R. (busy) signal goes high to indicate printer is not ready
Ignore	-	D.T R. signal is ignored.

ERROR MESSAGES

The WPC game program has the capability to aid the operator and service personnel. At Game Turn-on, or after pressing the Begin Test switch, (once the game has been operating for an extended period), the display may signal with the message, "Press ENTER for Test Report". This indicates the game program has detected a possible problem with the game.

To obtain details of the problem, open the coin door and press the Begin Test switch. Press the Enter button to begin displaying the message(s). The following messages apply to your game.

Check Switch ##.

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or ≈30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep the game earning, until the service technician can repair the problem.

To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

Pinball Missing.

This game normally uses three balls; however, it will operate with one ball. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough switches or the Ball Shooter switch.

xxxxx Sw. is Stuck On.

This message indicates that a switch, which is not usually On, remains in the On position after the game is switched On. The stuck switch is essential for game play (for example, a coin chute switch, the slam tilt switch, the plumb bob tilt switch), and should be cleared to permit proper game operation.

Ground Short Row-N, Wht-xxx.

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:

1. Slam Tilt (or other coin door) switch touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hanger, etc.) into the game
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part
5. All switches in a row closing at the same time. Note: This instance is NOT a switch problem; however, for most games this is a very rare possibility.

U6 Checksum Error.

The game ROM checksum is invalid. If this occurs replace the game ROM.

Time and Date Not Set.

The real time clock is not running. If this occurs go to U.4 of the Utilities Menu and set the time and date.

Factory Settings Restored.

This message indicates that the CMOS RAM no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltage at pin 28 and pin 26 of U8 should be +5V (game turned On) and at least +4V (game turned Off). When the voltage drops below +4 V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2 on the CPU Board. D1 should read 0 ohms when forward-biased and infinite ohms when reverse-biased. D2 should read 15 ohms when forward-biased and infinite ohms when reverse-biased. Note: Readings taken from Analog Meter. This message can also indicate that there is an open diode on a 50V coil, and noise is entering the circuit.

Trap Door Down Error**Trap Door Up Error**

The Trap Door did not get to its intended position. Go to "T.12 Trap Door Test" and check the "TRAP DOOR DOWN" switch, the Trap Door linkage, and the coils for proper operation.

Mini-playfield Error - C.W. Direction Reversed**Mini-playfield Error - C.C.W. Direction Reversed****Mini-playfield Error - No C.W. Movement****Mini-playfield Error - No C.C.W. Movement**

The Mini-playfield has a problem positioning itself.

The abbreviations C.W. is clockwise direction, C.C.W. is counter clockwise as viewed from the front of the game. If both reversed errors occur, the DC motor is wired backwards. If only 1 reversed message occurs, the motor direction driver is stuck on/off (loose wire?).

No movement in both directions can be a fuse or loose wire from the motor. No movement in one direction can indicate a loose wire, binding playfield, or a defective motor controller board.

Examine Left Jet Bumper Switch**Examine Right Jet Bumper Switch****Examine Bottom Jet Bumper Switch**

The game detected an unusually low number of hits on the indicated jet bumper. Examine and/or adjust the switch while in diagnostics. The error message(s) are removed when any jet bumper is hit during any diagnostic mode.

CPU L.E.D.'s

The CPU has three L.E.D.'s located on the upper left side of the board: D19, D20, and D21. On game power-up D19 and D21 turn On for a moment then, D19 turns Off and D20 starts to blink rapidly. D21 remains On. The system has detected a problem if the following happens:

CPU Board L.E.D. Error Codes

Center L.E.D. blinks one time	-	ROM Error U6
Center L.E.D. blinks two times	-	RAM Error U8
Center L.E.D. blinks three times	-	Custom Chip Failure U9

Sound Board Beep Error Codes

Upon Game Turn-On:

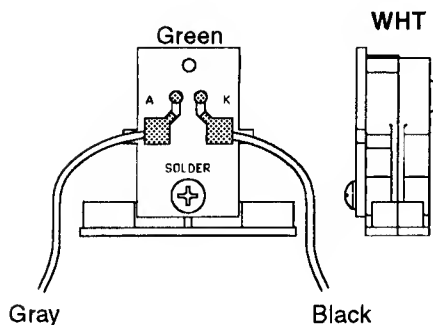
1 Beep	=	Sound Board O.K.
2 Beeps	=	U9 Failure (RAM)
3 Beeps	=	U18 Failure (ROM)
4 Beeps	=	U15 Failure (ROM), if used
5 Beeps	=	U14 Failure (ROM), if used

OPTO THEORY

The opto receiver (detector) should be approximately 0.1-0.7 volts when the opto beam is unblocked and approximately 11-13 volts when the opto beam is blocked. The opto transmitter (emitter or L.E.D.) should always be approximately 1.4 volts. Note, the transmitter (L.E.D.) is larger than the receiver (it protrudes further from its case).

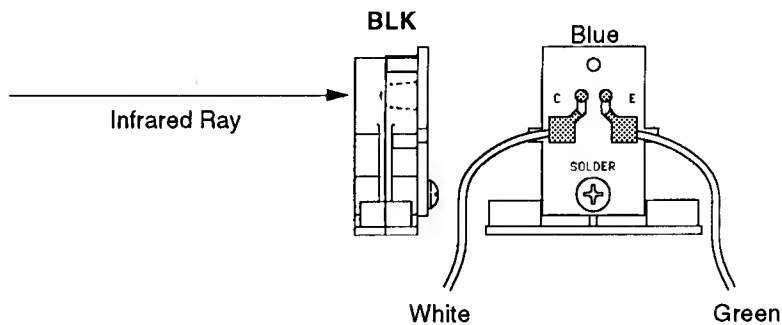
Transmitter

1.0-1.4 Volts

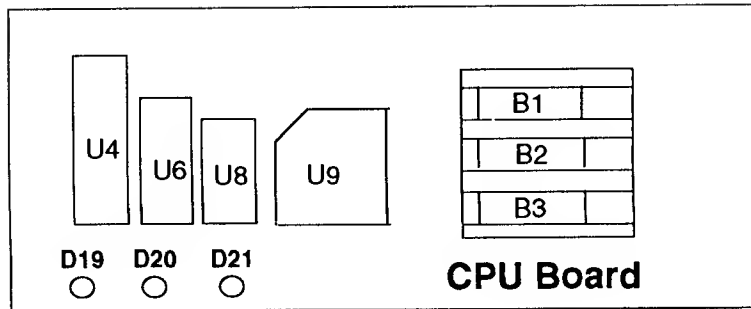


Receiver

0.1-0.7V Unblocked
11-13V Blocked



LED List



CPU Board

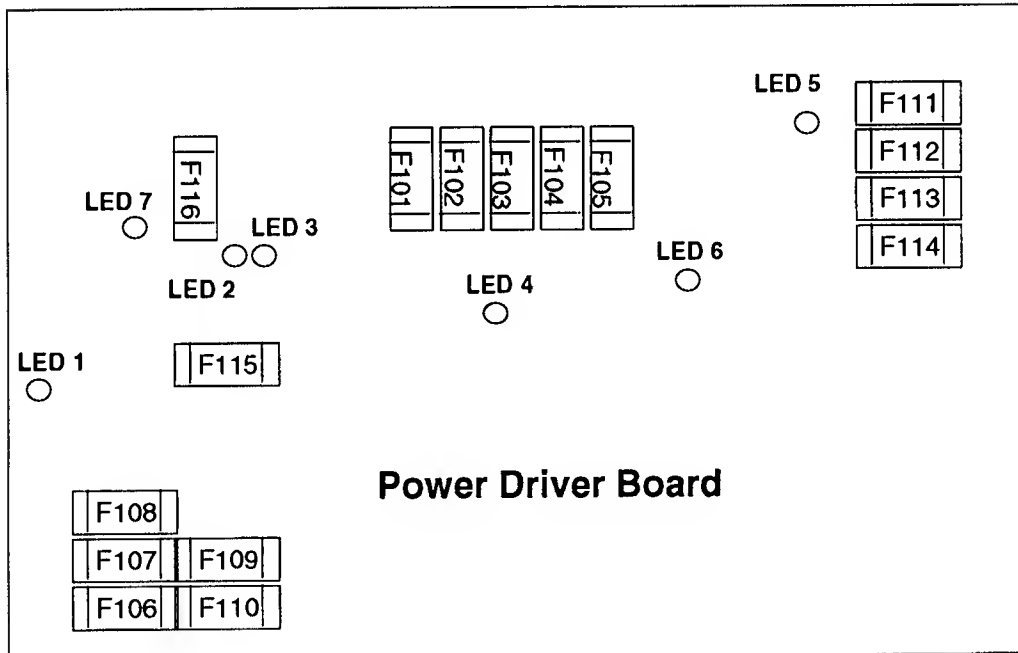
D19, Blanking

D20, Diagnostic

D21, +5vdc

At Game Turn-On = D19 & D21 On, D20 Off

During Normal Operation = D19 Off, D20 flashing, D21 On



Power Driver Board

LED 1, +12vdc, Switch Circuit, Normally On

LED 2, High/Low Line Voltage Sensor, Normally On

LED 3, High/Low Line Voltage Sensor, Normally Off

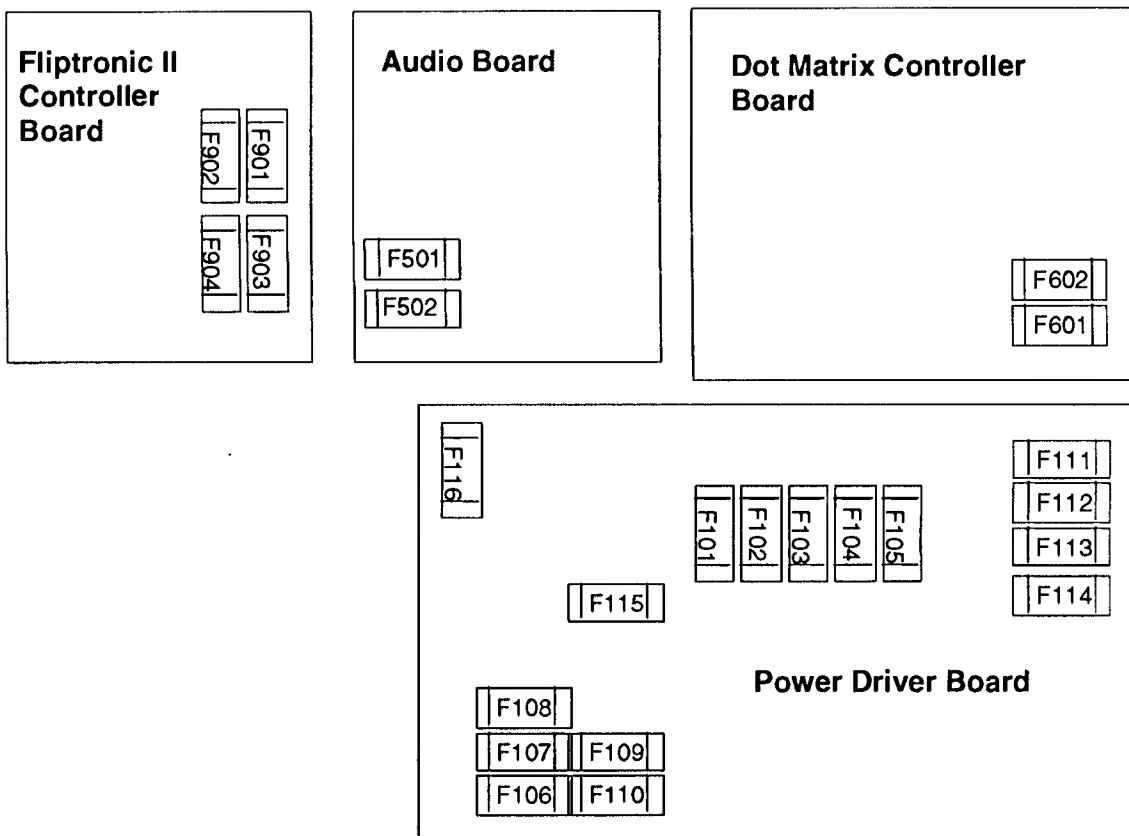
LED 4, +5vdc, Digital Circuit, Normally On

LED 5, +20vdc, Flashlamp Circuit, Normally On

LED 6, +18vdc, Lamps Circuit, Normally On

LED 7, +12vdc, Power Circuit (Motors, Relays, Etc.), Normally On

Fuse List



Audio Board

F501 -25V Circuit 3A, S.B.
F502 +25V Circuit 3A, S.B.

Dot Matrix Controller Board

F601 +62V Circuit 3/8A, S.B.
F602 -113V and -125V Circuits 3/8A, S.B.

Power Driver Board

F101 Left Flipper 3A, S.B. (Not Used)
F102 Right Flipper 3A, S.B. (Not Used)
F103 Solenoid #25-#28 3A, S.B.
F104 Solenoid #9-#16 3A, S.B.
F105 Solenoid #1-#8 3A, S.B.
F106 G.I. #5 Wht-Vio 5A, S.B.
F107 G.I. #4 Wht-Grn 5A, S.B.
F108 G.I. #3 Wht-Yel 5A, S.B.
F109 G.I. #2 Wht-Org 5A, S.B.
F110 G.I. #1 Wht-Brn 5A, S.B.
F111 Flasher Secondary 5A, S.B.
F112 Solenoid Secondary 5A, S.B.
F113 +5V Logic 5A, S.B.
F114 +18V Lamp Matrix 8A, N.B.
F115 +12V Switch Matrix 3/4A, S.B.
F116 +12V Secondary 3A, S.B.

Fliptronic II Controller Board

F901 Upper Left Flipper 3A, S.B.
F902 Upper Right Flipper 3A, S.B.
F903 Lower Left Flipper 3A, S.B.
F904 Lower Right Flipper 3A, S.B.

Line Filter

Domestic Game 8A
Foreign Game 5A, S.B.

MAINTENANCE INFORMATION

LUBRICATION

The two main lubrication points of the Ball Shooter Lane Feeder mechanism are the pivots for the arm. The mechanism of other playfield devices are somewhat similar and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices.

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure.

Lubrication to ensure proper operation also applies to the target blades of Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, (Bally part number of EI 165), is a recommended lubricant.

SWITCH CONTACTS

Playfield Switches

For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about 2 inches, which should restore the clean contact surface. Adjust the switch contacts to a 1/16-inch gap.

Flipper Switches

This game uses the new Fliptronic II Electronic Flipper System. The end-of-stroke switches are NORMALLY OPEN and should close when the flipper is energized. All end-of-stroke switches and flipper button cabinet switches are gold flashed computer grade leaf switches. Only low computer current is carried through these switches. DO NOT FILE or abrasively clean these switches! DO NOT REPLACE these switches with the old style tungsten high current type switches, as intermittent operation could occur. Please note that unlike the old style of flipper, an end-of-stroke switch failure will not harm the flipper. The game will notify the operator of a switch being mis-adjusted in the test report, but will continue to play. The end-of-stroke switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

CLEANING

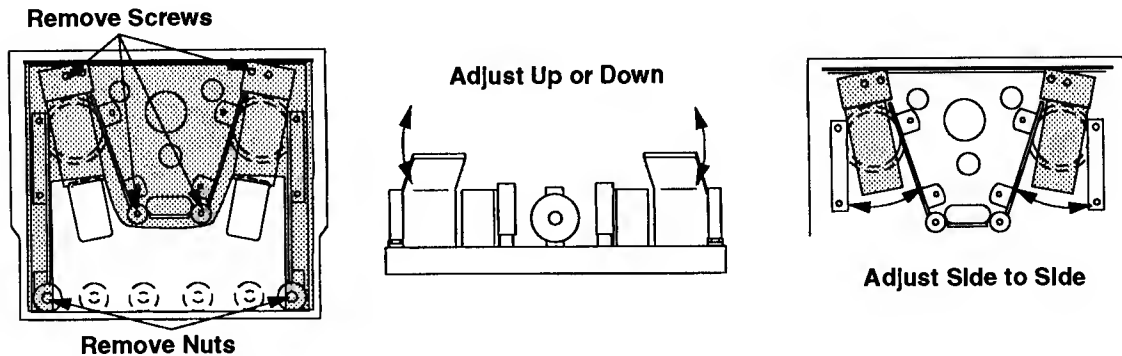
Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for any chips, nicks, or pits. Replace any damaged balls to prevent playfield damage.

Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface. Do not use cleaners containing petroleum distillates on any playfield plastics because they may dissolve the plastic material or damage the artwork.

PLAYFIELD ADJUSTMENTS

PLAYFIELD GLASS SWITCH:

The playfield glass switch should be adjusted so that when the glass is inserted, the switch closes when the front of the glass is in line with the front of the cabinet. Use Test Menu, T.1 Switch Edges, switch #82, to check adjustment.

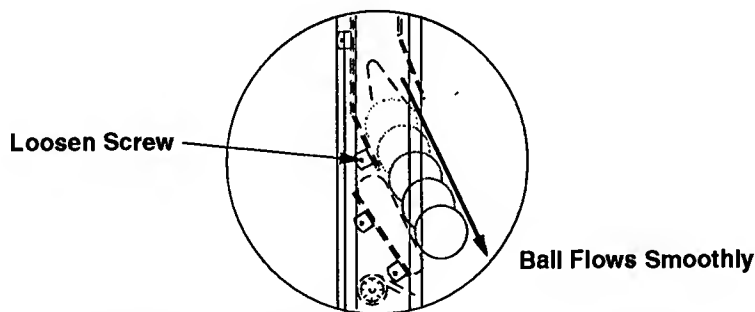


MINI-PLAYFIELD BALL EJECT:

To adjust ejects from kicking the ball down the center of the playfield to the outhole:

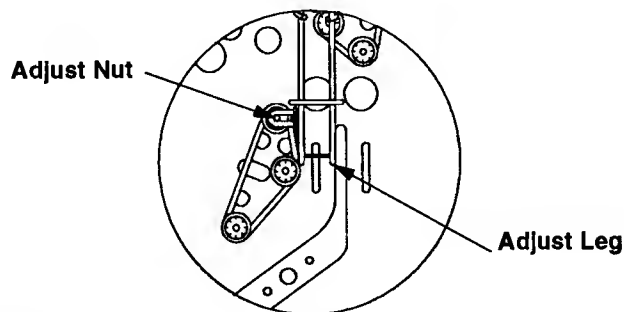
First remove the (4) screws and (2) nuts from the plastic shroud covering the mini-playfield assembly. Remove shroud. Then, **either**;

1. with pliers, bend the ball deflectors up or down slightly, **or**;
 2. loosen the (2) screws on the ball deflectors and turn slightly. Tighten the screws **and**;
- Test the eject action for accuracy. The ball, when ejected, should hit the lower playfield flippers.



BALL ROLLOUT FROM HANG ON LANE:

Ball should roll out of the Hang On Lane smoothly. To adjust, loosen the screw on the ball guide just above flipper. Move the ball guide so that the ball when rolling off the ball guide is even with the flipper. Ball should not bounce off or drop onto the flipper when rolling.



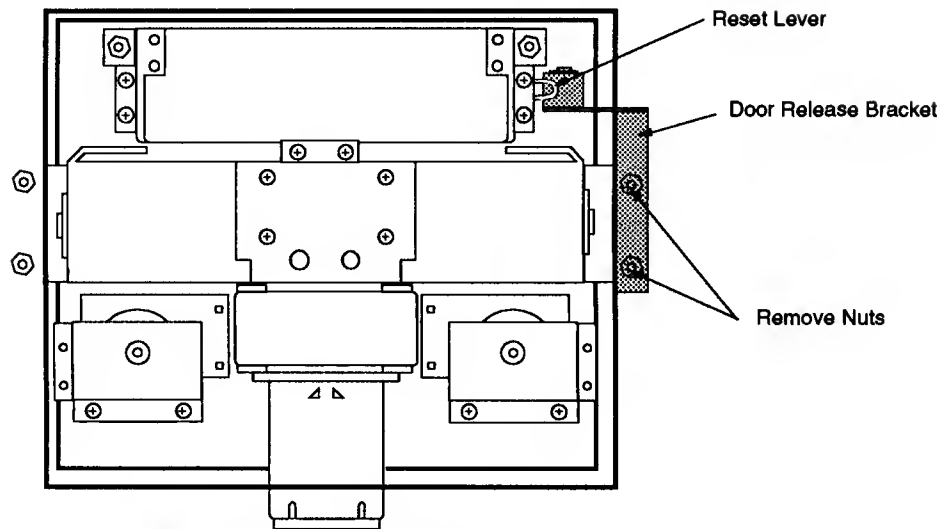
RIGHT WIRE RAMP BALL DROP:

To prevent the ball from dropping into the drain lane from the Police Box wire ramp, **either**;

1. with pliers, bend the lower right leg of the ramp inward slightly, toward the center of playfield, **or**;
2. loosen nut and move ramp to the left.

This will help to reduce the balls backspin and guide it back into the ball return lane.

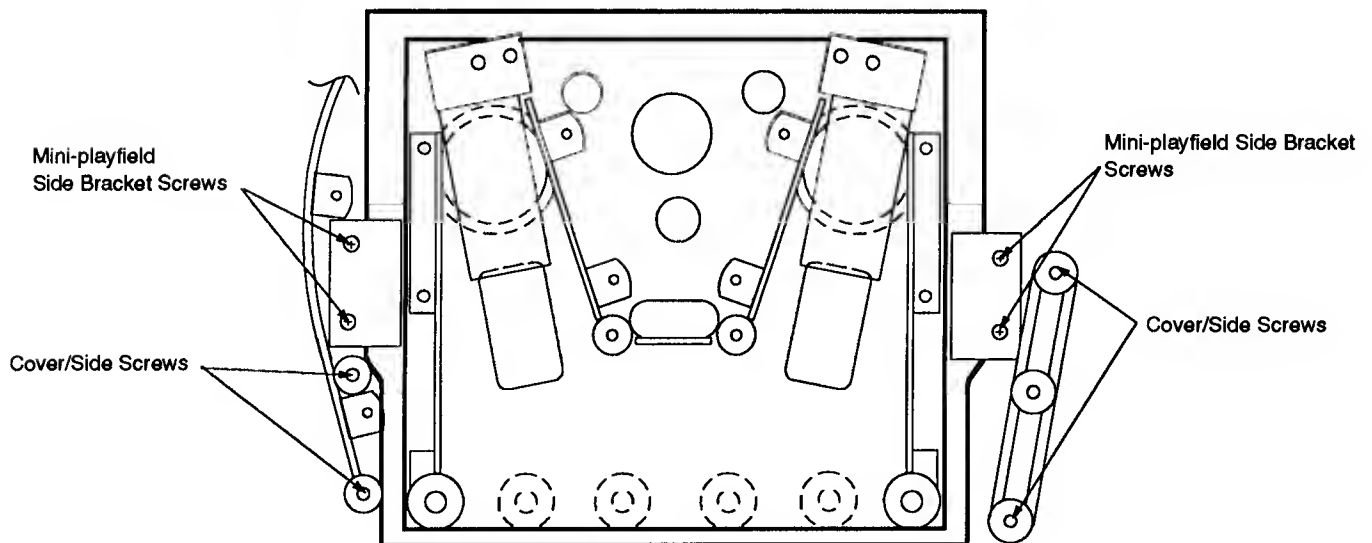
MINI-PLAYFIELD SERVICE INSTRUCTIONS



MINI-PLAYFIELD - BOTTOM VIEW

TO REMOVE THE MINI-PLAYFIELD ASSEMBLY (Bottom of Playfield):

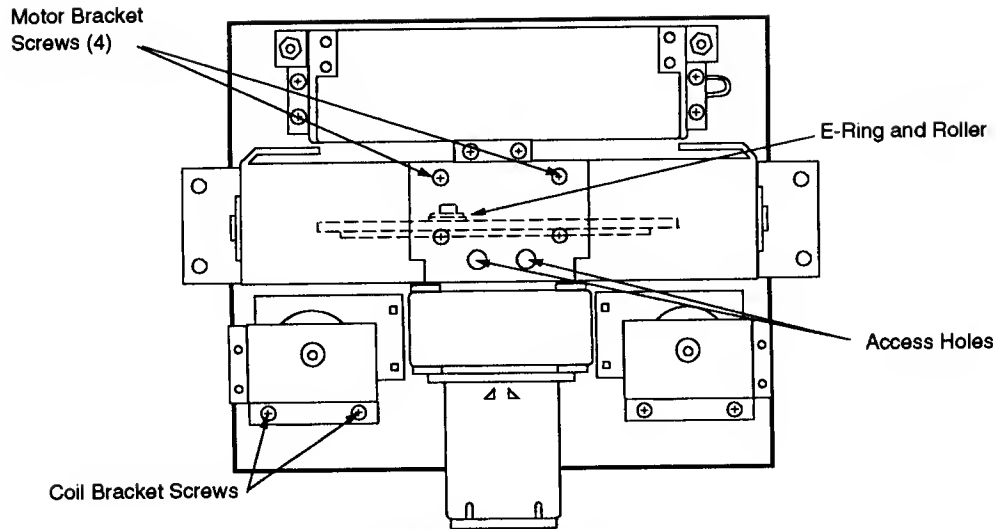
1. Mini-playfield should be in the down position.
2. Turn power OFF.
3. Remove (2) nuts, and lift off Door Release Bracket. When reassembling, position mini-playfield in the middle position (use diagnostics). Then, mount Release bracket against flip-up target reset lever, so that the targets drop. Tighten nuts.
4. Disconnect all cables from mini-playfield assembly.



MINI-PLAYFIELD - TOP VIEW

(Top of Playfield)

5. Remove (4) screws on Cover/Side Bracket.
6. Remove (4) screws from Mini-playfield Side Brackets.
7. Carefully lift mini-playfield up, then tilt back slightly to avoid catching motor.



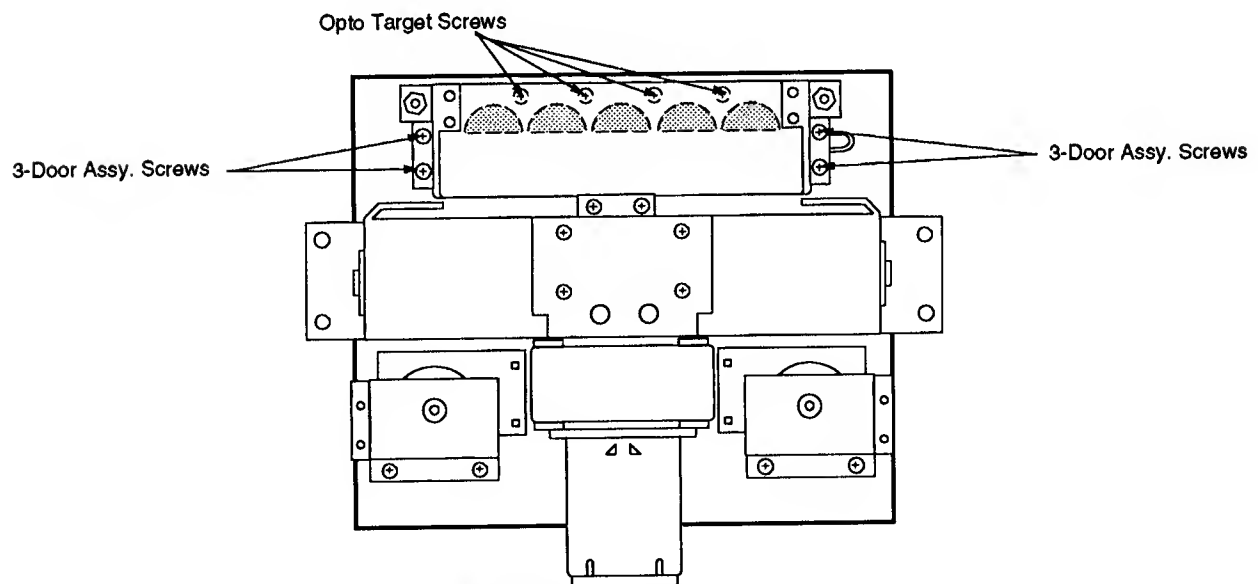
MINI-PLAYFIELD - BOTTOM VIEW

TO REMOVE MOTOR BRACKET ASSEMBLY:

1. Remove E-ring and Roller from Cam.
2. Remove lower Opto (LED, white) Assembly, via the access holes.
3. Remove (4) screws from Motor Bracket.*

TO REMOVE EJECT COIL ASSEMBLIES:

1. Remove (2) screws on Coil Bracket Assembly.*



MINI-PLAYFIELD - BOTTOM VIEW

TO REMOVE OPTO TARGET ASSEMBLY:

1. Remove (4) screws on 3-Door Assembly.*
2. Remove (4) screws on Opto Target Assembly.*

***NOTE: APPLY LOCTITE TO THESE SCREWS WHEN REASSEMBLING.**

[illegible]

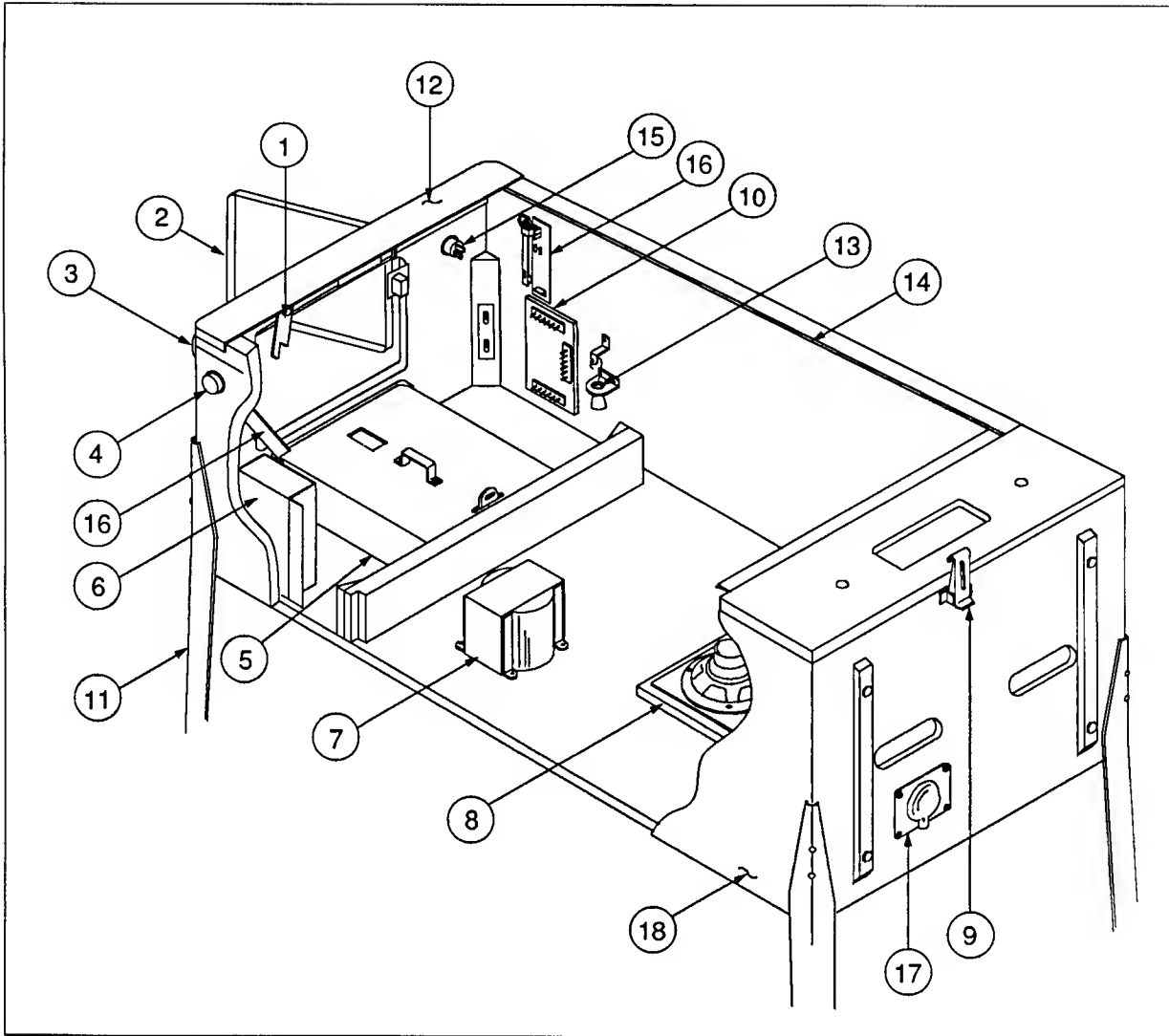
SECTION TWO

Game Parts Information

Line Filter/Cordset Application Chart

COUNTRY	LINE FILTER ASSY.			CORDSET								
	A-15707-120V	A-15707-230V		5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	H-15756
UNITED STATES	●			●								
CANADA	●			●								
TAIWAN	●			●								
MEXICO	●			●								
CENTRAL AMERICA	●			●								
SOUTH KOREA	●			●								
PUERTO RICO	●			●								
AUSTRIA		●			●							
BELGIUM		●			●							
FINLAND		●			●							
FRANCE		●			●							
GREECE		●			●							
HOLLAND		●			●							
HUNGARY		●			●							
NETHERLANDS		●			●							
NETH. ANTILLES		●			●							
NORWAY		●			●							
POLAND		●			●							
PORTUGAL		●			●							
SPAIN		●			●							
SWEDEN		●			●							
TURKEY		●			●							
WEST GERMANY		●			●							
UNITED KINGDOM		●				●						
IRELAND		●				●						
HONG KONG		●				●						
DENMARK		●					●					
ITALY		●						●				
CHILE		●						●				
PEOPLE'S REP. OF CHINA		●						●				
SWITZERLAND		●							●			
AUSTRALIA		●								●		
NEW ZEALAND		●								●		
ARGENTINA		●								●		
JAPAN	●										●	●

Cabinet Parts



Cabinet Parts

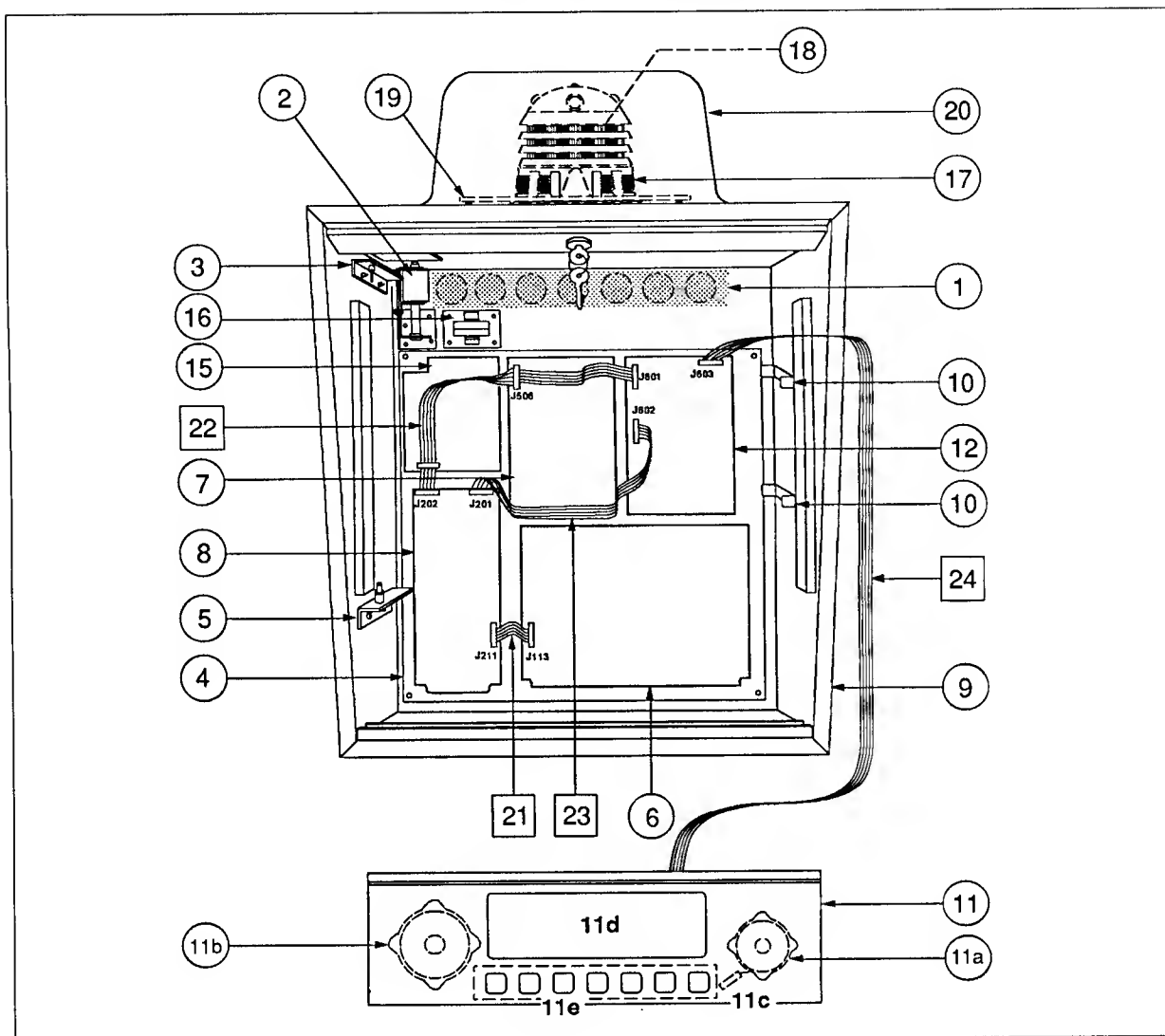
Item	Part Number	Description	Item	Part Number	Description
1.	D-9174-3	Lever Guide Assembly	16.	A-15894	Flipper Opto Board (2 Used)
2.	A-14148-1	Coin Door - 2 Slot	17.	01-10714	Line Cord Cover
3.	A-15896	Lit Switch Button Assembly	18.	11-1066-20006	"Doctor Who" Wood Cabinet
4.	B-12273-6	Flipper Button - Yellow (2 Used)	19.	*	Cordset
5.	A-15459-1	Cashbox Assembly			
6.	*	Line Filter Assembly			
7.	5610-12835-00	WPC Transformer, 115/230v			
8.	5555-12929-00	Speaker, 4Ω, 6", 25w			
9.	20-9347	Toggle Latch			
10.	A-14689	WPC Coin Door Interface Bd.			
11.	C-10843-1	Metal Leg Assembly			
12.	D-12615	Front Molding Assy.			
13.	20-6502-A	Plum Bob			
14.	A-12359-3	Side Molding Assembly			
15.	20-9663-1	Start Button			

Miscellaneous Parts

08-7028-T	Tempered Playfield Glass: 21" x 43"
20-6500	Steel Ball, 1-1/16" (3)

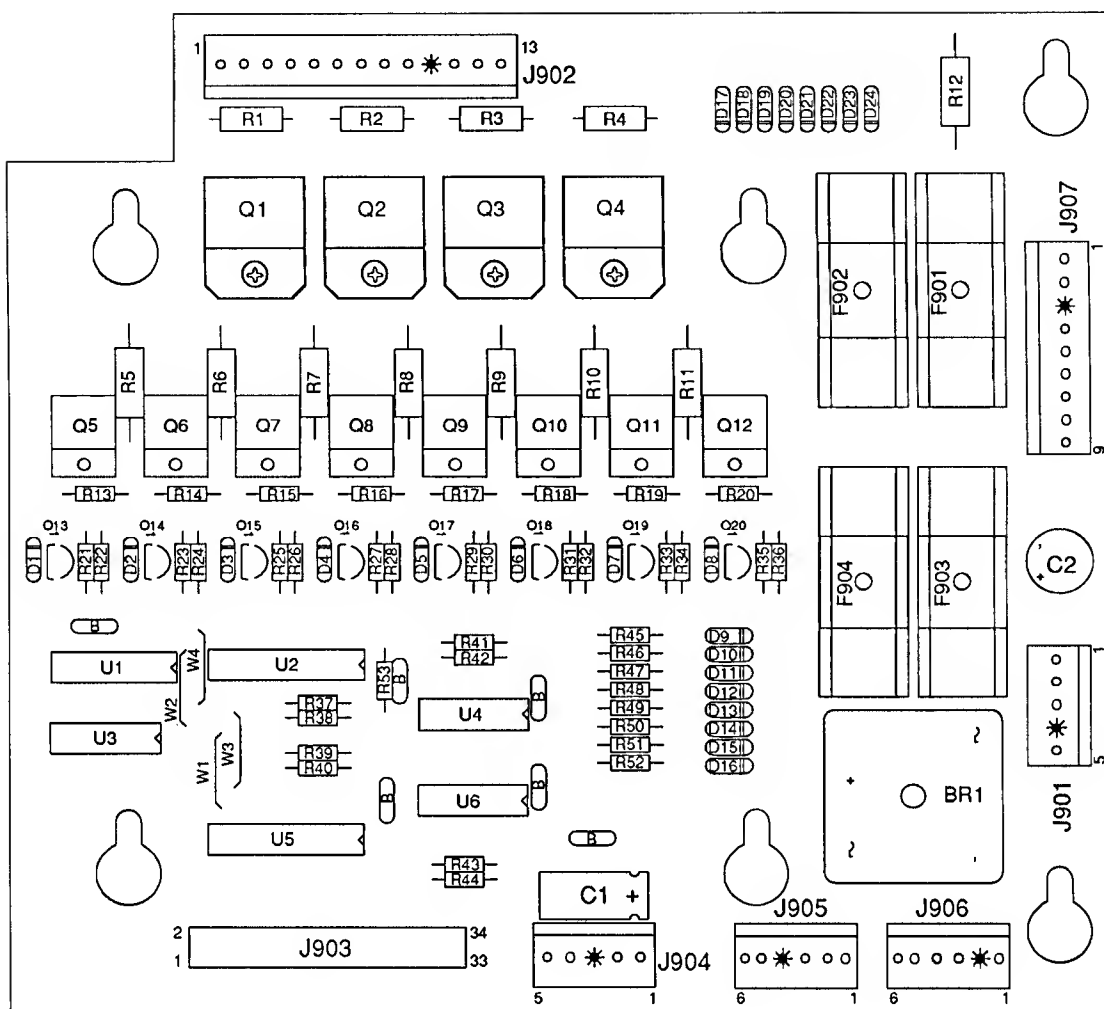
* See Application Chart (p.2-2).

Backbox Assembly



Item	Part Number	Description	Item	Part Number	Description
1.	01-6645	Venting Screen	16.	A-15309-1	2-10W Resistor Board
2.	B-10686-1	Knocker & Bracket Assy.	17.	A-16199	Dalek Assembly
3.	A-12497	Upper Insert Bd Hinge Assy.	18.	A-16191	Dalek Light Assembly
4.	A-14092-3	Mounting Plate Assembly	19.	A-15742	4-Lamp Board
5.	A-12498	Lower Insert Bd Hinge Assy.	20.	A-15748	Cover Assembly
6.	A-12697-1	Power Driver Assembly	Ribbon Cables:		
7.	A-12738-20006	WPC Sound Board	21.	5795-12653-03	Ribbon Cable, 3"
8.	A-12742-20006	WPC CPU Board	22.	5795-13018-00	Ribbon Cable, 22"
9.	A-14376-20006	Backbox Assembly	23.	5795-10938-14	Ribbon Cable, 14"
10.	01-9047	Insert Stop Bracket	24.	5795-12838-30	Ribbon Cable, 30"
11.	A-15823	Speaker / Display Assy.	Miscellaneous Parts:		
a)	5555-12924-00	Speaker, 4Ω, 15w	A-8552-20006	Tempered Backglass Assy.	
b)	5555-12856-00	Speaker, 5-1/4", 4Ω, 25w	08-7456	Backbox Glass: 27" x 18-7/8"	
c)	5045-12914-00	Cap., 10μfd., 50v, (±20%)	31-1357-20006	Screened Translight	
d)	5901-12784-00	Dot Matrix Display/Driver Bd.	03-8228-2	Glass Channel Top (1)	
e)	A-15805	7-Lamp Board Assembly	03-8228-3	Glass Channel Edge (2)	
12.	A-14039	Dot Matrix Controller Board	03-8229-1	Glass Lift Channel (1)	
13.	A-13379	Lock & Plate Assembly			
a)	20-9637	Lock & Cam Kit			
14.	20006-IN	Insert Board			
15.	A-15472	Fliptronic II Board			

A-15472 Fliptronic II Board



Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1 - D24	Diode 1N4004
20-9684	Q5-Q12	Fastener Snap	5162-12635-00	Q5-Q12	Transistor TIP102 NPN
4006-01003-08	Q1-Q4	Mach. Screw, 6-32	5190-09016-00	Q13 - Q20	Transistor 2N4403 PNP
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5191-12179-00	Q1-Q4	Transistor TIP36C PNP
5010-09034-00	R37 - R44, R53	Resistor, 10K Ω , 1/4w, 5%	5315-12009-00	U2	IC 74HCT374
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45 - R52	Resistor, 1K Ω , 1/4w, 5%	5315-12031-00	U5	IC 74HCT244
5010-09361-00	R1 - R4	Resistor, 220 Ω , 1/2w, 5%	5315-12812-00	U1	IC 74HCT138
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Resistor, 470 Ω , 1/4w, 5%	5315-12951-00	U3	IC 74HCT00
5010-09534-00	W3, W4	Resistor, 0 Ω	5370-12272-00	U4, U6	IC LM339 QUAD COMP
5010-10171-00	R13 - R20	Resistor, 56 Ω , 1/4w, 5%	5791-10862-09	J907	Connector, 9-pin Header Sq. Pin
5011-12956-00	R5 - R12	Resistor, 2.7K Ω , 1w, 5%	5791-10862-05	J901, J904	Connector, 5-pin Header Sq. Pin
5040-08986-00	C1	Capacitor, 100M, 10v	5791-10862-13	J902	Connector, 13-pin Header Sq. Pin
5043-08980-00	B	Capacitor, .01 μ F, 50v	5791-12461-06	J905, J906	Connector, Str Sq. Pin Header .100
5040-09537-00	C2	Capacitor, 100 μ F, 100v	5791-12516-00	J903	34 HEN 2x17 STR
			5100-09690-00	BR1	Bridge Rectifier
			5731-10356-00	F901 - F904	Fuse S-B, 3A., 250v
			5733-12060-01	-	Fuse Holder (F901-F904)

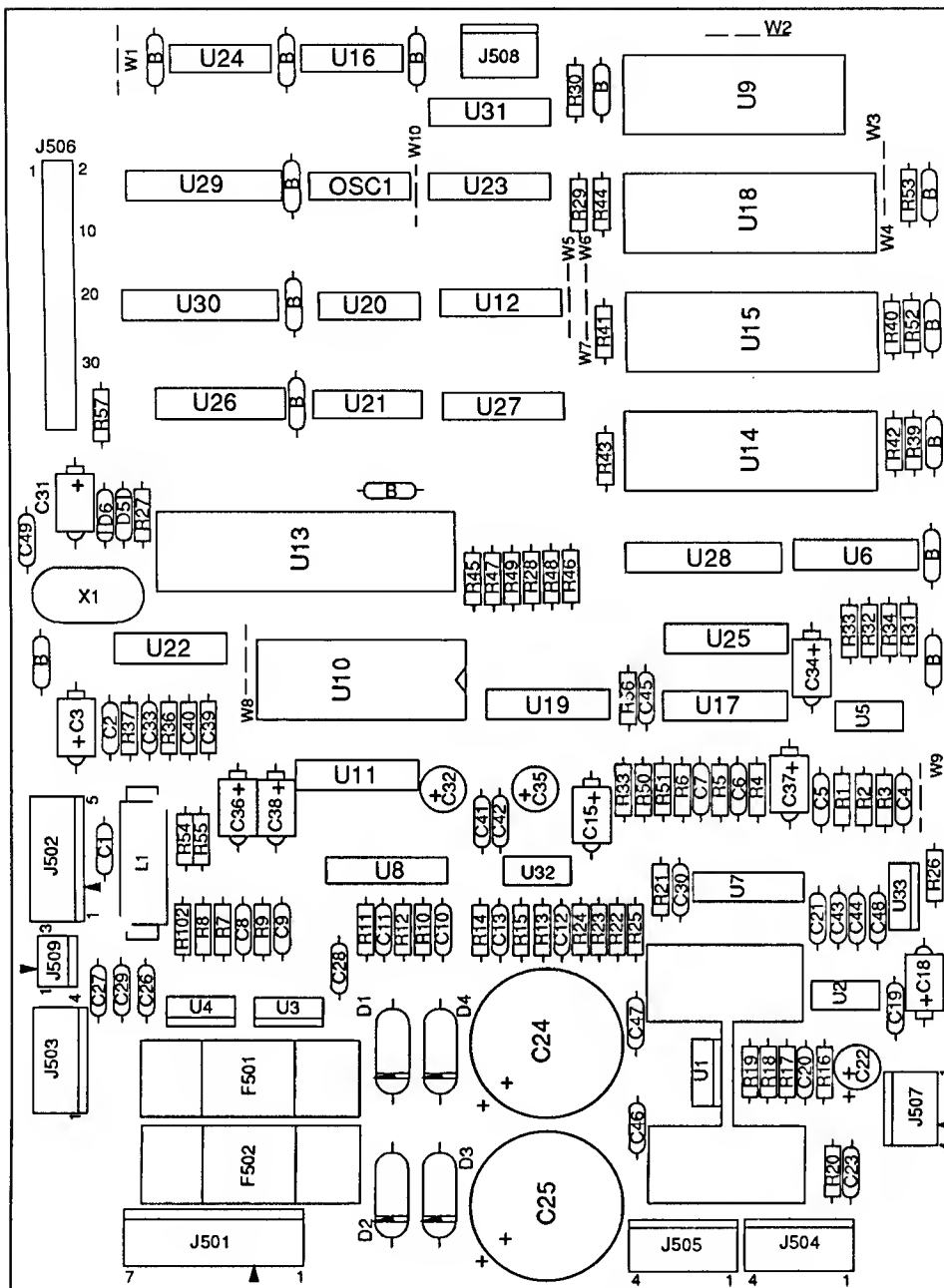
A-12738-20006

WPC Audio Board

Part No.	Designator	Description
01-9980		Shield: Wire Protector
4004-01005-06	U1	Mach. Screw, 4-40 x 3/8
4104-01012-04	U1	Sh. Mach. Screw, #4 x 1/4
4404-01119-00	U1	Nut, 4-40 SNUT
5010-08772-00	R21	Resistor, 15K Ω , 1/4w, 5%
5010-12065-00	R22, R25	Resistor, 120K Ω , 1/4w, 5%
5010-08991-00	R51	Resistor, 4.7K Ω , 1/4w, 5%
5010-10987-00	R23, R24	Resistor, 56K Ω , 1/4w, 5%
5010-09034-00	R13, R14, R29-R31, R33, R34, R50, R45-R49	Resistor, 10K Ω , 1/4w, 5%
5010-09035-00	R4	Resistor, 47K Ω , 1/4w, 5%
5010-09036-00	R35	Resistor, 100 Ω , 1/4w, 5%
5010-09134-00	R1, R2, R6, R8, R9, R11, R12	Resistor, 150K Ω , 1/4w, 5%
5010-09162-00	R26, R102	Resistor, 100K Ω , 1/4w, 5%
5010-08774-00	R3, R5, R17, R19	Resistor, 22K, 1/4w, 5%
5010-09269-00	R15	Resistor, 12K Ω , 1/4w, 5%
5010-09358-00	R18, R32	Resistor, 1K Ω , 1/4w, 5%
5010-09416-00	R28, R36, R37, R39-R44 R52, R53, R57	Resistor, 470 Ω , 1/4w, 5%
5010-09534-00	W3, W5, W7-W10	Resistor, 0 Ω
5010-10171-00	R38, R58	Resistor, 56 Ω , 1/4w, 5%
5010-10258-00	R16	Resistor, 1M, 1/4w, 5%
5010-10650-00	R7, R10	Resistor, 62K, 1/4w, 5%
5010-10989-00	R54, R55, R27	Resistor, 470K, 1/4w, 5%
5010-12752-00	R20	Resistor, 1 Ω , 1/4w, 5%
5040-08986-00	C3	Capacitor, 100M, 10v (\pm 20%)
5040-09332-00	C15, C18, C34, C36, C38	Capacitor, 47 μ fd., 25v, Axial
5040-11036-00	C32, C35	Capacitor, 47 μ fd., 16v, Rad
5040-12729-00	C24, C25	Capacitor, 4700 μ fd., 35v.
5040-12750-00	C22	Capacitor, 22 μ fd., 35v, Rad.
5041-09031-00	C26-C29, C37, C46-C48	Capacitor, 1 μ fd. TANT
5041-09243-00	C20, C21	Capacitor, 10 μ fd. TANT
5043-08980-00	C41-C44, B(15)	Capacitor, .01M, 50v, (+80, -20)
5043-08996-00	C1, C2	Capacitor, .1 μ fd., 50v, 10%
5048-11027-00	C8, C10	Capacitor, 33pfd., 50v, 10%
5048-11028-00	C45	Capacitor, 22pfd., 50V, Axial
5048-11029-00	C33, C49	Capacitor, 100pfd., 50v
5048-11030-00	C12	Capacitor, 470pfd., 50v
5048-11031-00	C19, C31	Capacitor, .001 μ fd., 50v, 10%
5048-11065-00	C13	Capacitor, .0022 μ fd., 50v, 10%, Ax.
5048-11072-00	C39, C40	Capacitor, .0033 μ fd.
5048-12036-00	C23	Capacitor, .22 μ fd., 10v, Ceramic
5048-12745-00	C4, C6	Capacitor, 1800pfd., 50V, 10%
5048-12746-00	C5, C7	Capacitor, 330pfd., 50V
5048-12748-00	C9, C11, C30	Capacitor, 220pfd., 50V

Part No.	Designator	Description
5070-08919-00	D5, D6	Diode, 1N4148
5070-09045-00	D1-D4	Diode MR501, 3.0A
5250-10495-00	U3	Reg. 7912 1.0A -12v.
5281-09215-00	U22	IC, 74LS04 Hex INV
5281-09246-00	U12	IC, 74LS139 2-4 Dec.
5281-09486-00	U28-U30	IC, 74LS374 8 Dual Flipflop
5281-09487-00	U6, U23-U25	IC, 74LS74 Dual Flipflop
5281-09500-00	U31	IC, 74LS32
5281-09745-00	U26, U27	IC, 74LS138 DMLTPX
5281-09850-00	U20	IC, 74LS11 Tripple AND
5281-10577-00	U16	IC, 74LS125 Q/B Bfr
5370-11086-00	U10	IC, YM2151 Sound
5371-11087-00	U11	IC, YM3012 D/A
5400-10320-00	U13	IC, MPU 68B09E
5284-12651-00	U21	IC 4584
5340-12278-00	U9	S/Ram 2064
5370-09691-00	U17	IC, 55536 CVSD
5370-12260-00	U2	IC, 3340 Elec Atten
5370-12728-00	U1	IC, Audio Amp LM1875
5370-12730-00	U7, U8	IC, Op Amp TL084
5370-12742-00	U32	IC, Op Amp TL082
5371-12727-00	U19	Dac AD7524
5432-12726-00	U5	EE Prom Pot X9503
5460-12423-00	U4	IC, LM7812
5460-12743-00	U33	LM7809 TO-220
5520-09020-00	X1	Crystal, 3.58 MHz.
5521-10931-00	OSC1	Oscillator, 8.0 MHz.
5551-09822-00	L1	Ind, 4.7UH 3.0A.
5700-08985-00	U13	Socket, IC 40-pin, .6"
5700-09004-00	U10	Socket, IC 24-pin, .6"
5700-09006-00	U11	Socket, IC 16-pin, .3"
5341-13406-U14	U14	IC, Audio ROM
5341-13408-U15	U15	IC, Audio ROM
A-5343-20006-3	U18	IC, Audio ROM
5700-12088-00	U1	Socket, IC 32-pin (U15, U18)
5705-12755-00		Heatsink 5299B-220
5731-10356-00	F501, F502	Fuse, 3A, S-B, 250v
5733-12060-01		Fuse Holder (F501, F502)
5791-10862-04	J504, J505	Connector, 4-pin Header Sq. .156
5791-10862-05	J502	Connector, 5-pin Header Sq. .156
5791-10862-07	J501	Connector, 7-pin Header Sq. .156
5791-12462-03	J509	Connector, 3-pin Header Sq. .100
5791-12462-04	J508	Connector, 4-pin Header Sq. .100
5791-12516-00	J506	34 Hen 2x17 STR

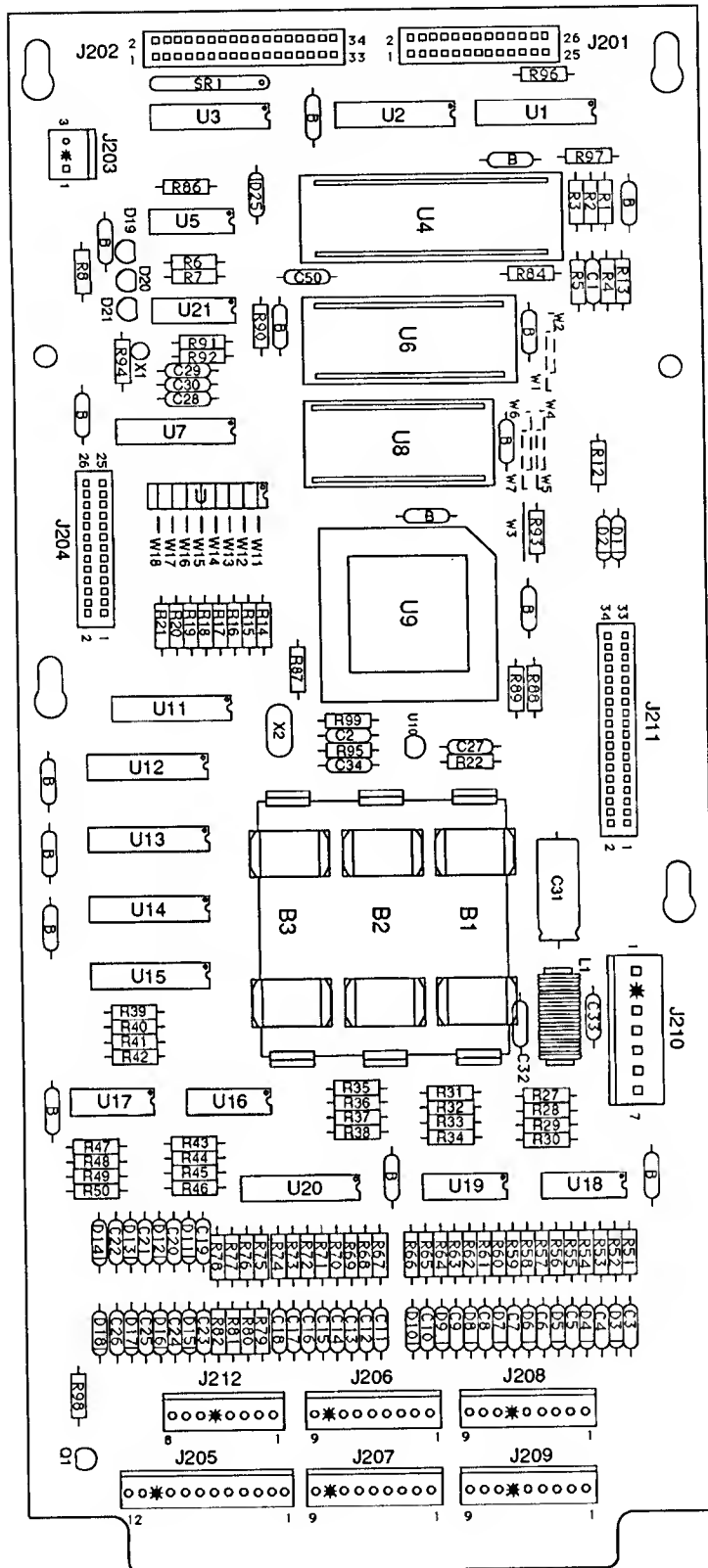
A-12738-20006 WPC Audio Board



A-12742-20006 WPC CPU Board

Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R90, R94, R98	Resistor, 10K Ω , 1/4w, 5%
5010-09085-00	R1, R2, R4, R93, R96, R97	Resistor, 1.5K Ω , 1/4w, 5%
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Resistor, 1.2K Ω , 1/4w, 5%
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84	Resistor, 1K Ω , 1/4w, 5%
5010-09416-00	R5-R8, R12, R13, R87-R89	Resistor, 470 Ω , 1/4w, 5%
5010-09534-00	W1, W4, W7, W13 - W18	Resistor, 0 Ω
5010-10258-00	R95, R99	Resistor, .01 μ fd Ω , 1/4w, 5%
5010-10989-00	R92	Resistor, 470K Ω , 1/4w, 5%
5010-12104-00	R91	Resistor, 22 μ fd, 1/4w, 5%
5019-09362-00	SIP 1	SIP, 9R, 10-pin, 4.7K Ω , 5%
5040-08986-00	C31	Capacitor, 100 μ fd, 10v (\pm 20%)
5043-08980-00	B	Capacitor, .01 μ fd, 50v, (+80, -20%)
5043-09030-00	C27	Capacitor, 0.047 μ fd, 50v (\pm 20%)
5043-09065-00	C3 - C26	Capacitor, 470pfd, 50v (\pm 20%)
5043-09491-00	C2, C29, C30, C34	Capacitor, 22pfd, 1KV, (\pm 10%)
5043-09492-00	C28	Capacitor, 100pfd, 50v, (\pm 10%)
5043-09845-00	C32, C33	Capacitor, 1KP, 50v, (\pm 20%)
5070-08919-00	D2 - D18	Diode, 1N4148, 150MA
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.
5160-10269-00	Q1	Transistor, 2N3904, NPN
5162-12422-00	U20	IC, ULN, 2803A
5281-09308-00	U3	IC, 74LS245, Octal Bus Trncv
5281-09486-00	U14	IC, 74LS374, 8D F/F
5281-09851-00	U5	IC, 74LS14, SMT/TRG
5281-09867-00	U1, U2, U7	IC, Octal Buffer, 74LS244
5281-10182-00	U11, U12, U13, U15	IC, 74LS240 Driver
5284-12651-00	U21	IC, 4584
5340-12278-00	U8	S/RAM 2064
5370-12272-00	U16 - U19	IC, LM339, Quad. Comp
5370-12687-00	U10	MC, 34064 Reset Chip
5520-10438-00	X2	Crystal, 8.0MHz.
5520-12084-00	X1	Crystal 32.768 KHz
5551-09822-00	L1	ILN, 4.7 UH 3A
5671-09019-00	D19 - D21	DSPL LED RED
5700-08985-00	U4	Socket, IC 40P, .6"
5700-12088-00	U6	Socket, IC 32P, .6"
5700-12424-00	U9	Socket, 84 Pin PLCC
5791-10850-00	J201, J204	Connector, 26-pin Header Str Sq.
5791-10862-07	J210	Connector, 7-pin Header Str Sq.
5791-12461-08	J212	Connector, 8-pin Header Str Sq.
5791-12461-09	J206 - J209	Connector, 9-pin Header Sq. pin
5791-12461-12	J205	Connector, 12-pin Header Sq. pin
5791-12516-00	J202, J211	34 Hen 2x17 STR
5881-09021-00	B1 - B3	Battery Holder "AA"
5048-11033-00	C50	Capacitor, 0.022 μ f, 10v
A-5343-20006-1	U6	Game PROM Assembly
5410-12426-00	U9	WPC-89 ASIC
5400-10320-00	U4	IC MPU 68B09E
5880-09022-00	B1 - B3	Battery, Alkaline, 1.5v ("AA")

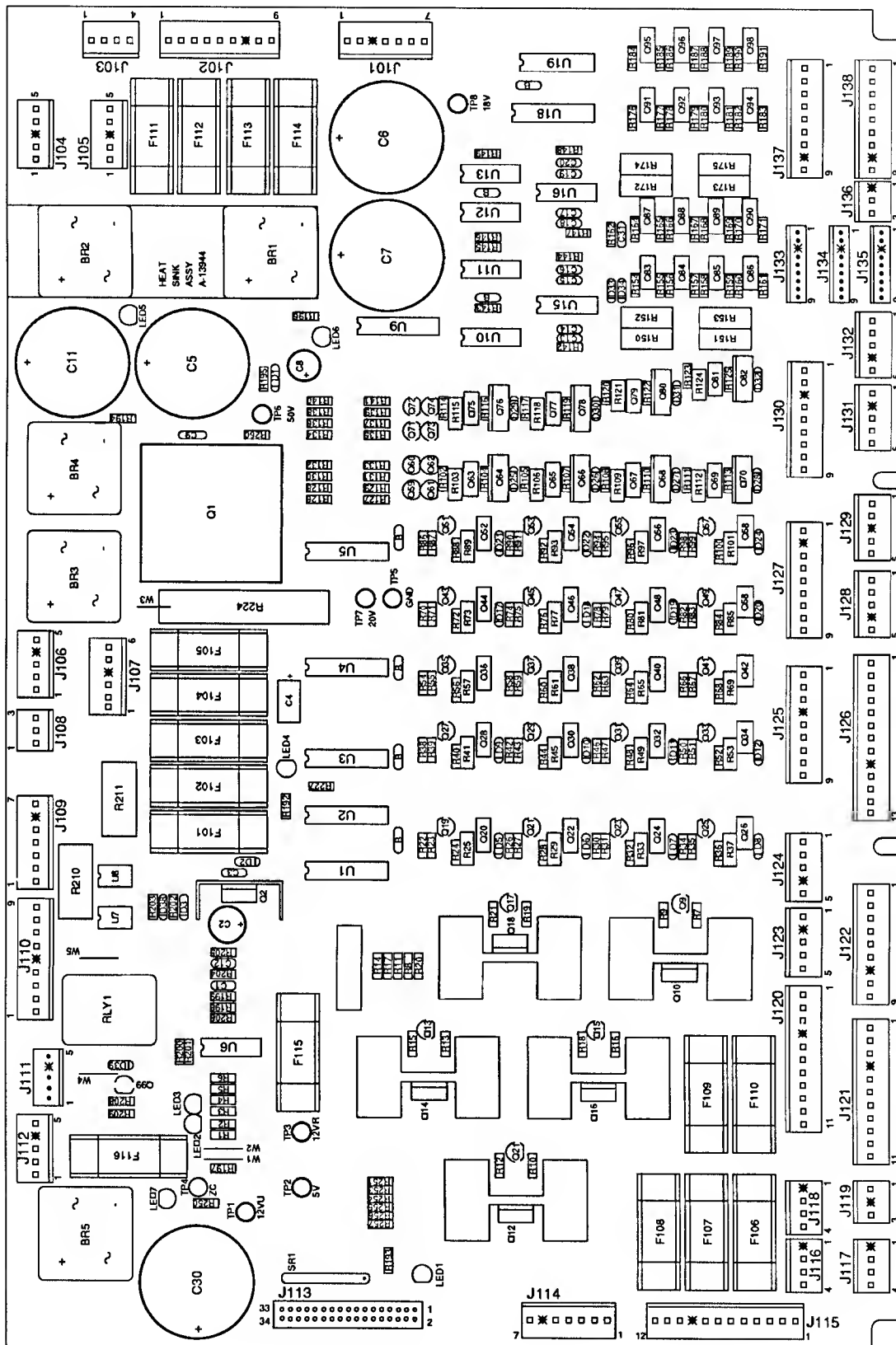
A-12742-20006 WPC CPU Board



A-12697-1 WPC Power Driver Assembly

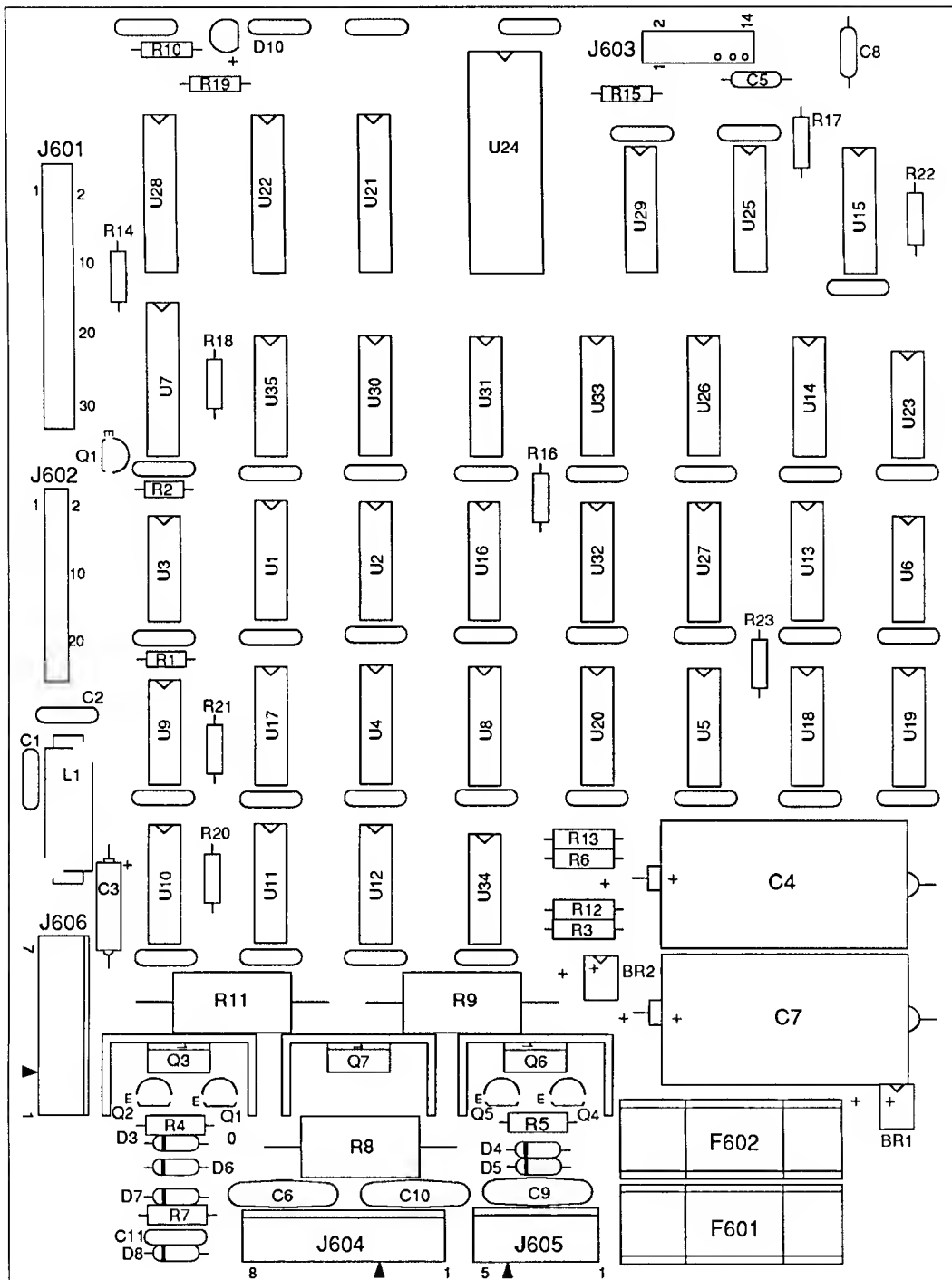
Item	Part Number	Ckt Designator	Description	Item	Part Number	Ckt Designator	Description
1	Not Used			32	5043-08996-00	C13-C20, C31	Capacitor, .1µfd, 50v (±20%)
2	4006-01005-06	Q1, Q2	Mach. Screw, 6-32 x 3/8	33	5043-09845-00	C1, C12	Capacitor, 1,000pfd, 50v (±20%)
3	4406-01128-00	Q1, Q2	Nut, 6-32 KEPS	34	5048-10994-00	C3	Capacitor, .33µfd, 50v (±20%) Ax.
4	4004-01005-06	Q10, Q12, Q14, Q16, Q18	Mach. Screw, 4-40 x 3/8	35	5070-08919-00	Q33, D34	Diode, 1N4148, 150MA.
5	4404-01119-00	Q10, Q12, Q14, Q16, Q18	Nut, 4-40 SNUT	36	5070-09054-00	Q1-D3, Q5-D12, Q17-D32, D38, D39	Diode, 1N4004, 1.0A.
6	5010-08981-00	R260	Resistor, 10KΩ, 1/2w, 5%	37	5100-09690-00	BR1-BR5	Bridge Rectifier, 35A., 200v
7	5010-08991-00	R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R209, R227	Resistor, 4.7KΩ, 14w, 5%	38	5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac, BT138E
8	5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Resistor, 560Ω, 1/4w, 5%	39	5162-12422-00	U19	IC, ULN 2803
9	5010-08993-00	R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R69, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124	Resistor, 68Ω, 1/4w, 5%	40	5162-12635-00	Q20, Q22, Q24, Q26, Q28, Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83 - Q90	Transistor, TIP 102
10	5010-08997-00	R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123, R195	Resistor, 2.7KΩ, 1/4w, 5%	41	5194-09055-00	Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74, Q99	Transistor, 2N5401 PNP
11	5010-08998-00	R155, R157, R159, R161, R165, R167, R169, R171	Resistor, 2.2KΩ, 1/4w, 5%	42	5191-12179-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
12	5010-09034-00	R3, R4, R6, R142-R149, R197-R198	Resistor, 10KΩ, 1/4w, 5%	43	5192-12428-00	Q91-Q98	Transistor, TIP 107
13	5010-09085-00	R194, R196, R251, R253-R257	Resistor, 1.5KΩ, 1/4w, 5%	44	5250-12634-00	Q1	Reg LM 323 5v
14	5010-09086-00	R252	Resistor, 6.8KΩ, 1/4w, 5%	45	5281-09486-00	U1-U5, U18	IC, 74LS374 8 Dual D Flipflop
15	5010-09224-00	R1, R2, R192, R201- R205, R208	Resistor, 270Ω, 1/4w, 5%	46	5281-09487-00	U10-U13	IC, 74LS74 Dual D Flipflop
16	5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Resistor, 1.2KΩ, 1/4w, 5%	47	5281-10182-00	U9	IC, 74LS240, L/Drv
17	5010-09324-00	R206	Resistor, 27KΩ, 1/4w, 5%	48	5370-12272-00	U6, U15, U16	IC, LM339 Quad. Comp
18	5010-09358-00	R154, R156, R158, R160, R164, R166, R168, R170, R182, R193, R199, R200, R250	Resistor, 1KΩ, 1/4w, 5%	49	5460-12423-00	Q2	IC, LM 7812
19	5010-09361-00	R104, R107, R110, R113, R116, R119, R122, R125	Resistor, 220Ω, 1/4w, 5%	50	5490-10892-00	U7, U8	Opto Isolator, 4N25
20	5010-09416-00	R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Resistor, 470Ω, 1/4w, 5%	51	5580-08994-01	RLY 1	Relay 4PDT 6VDC5A VS
21	5010-09534-00	W1, W2	Resistor, 0Ω	52	5671-09019-00	LED1 - LED7	Diaplay LED Red
22	5010-11079-00	R7, R10, R13, R16, R19	Resistor, 51Ω, 1/4w, 5%	53	5701-09652-00	Q1	Thermal Pad TQ-3
23	5010-12427-00	R150-R153, R172-R175	Resistor, .22Ω, 1w, 5%	54	5705-09199-00	Q2	Heatsink, #60308
24	5012-12632-00	R224	Resistor, .12Ω, 10w, 5%	55	Not Used		
25	5012-12238-00	R210, R211	Resistor, 3.3KΩ, 5w, 10%	56	5705-12637-00	Q1	Heatsink 5054
26	5019-10143-00	SR1	SiP, 9R, 10 pin, 470Ω, 5%	57	5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
27	5040-08986-00	C4	Capacitor, 100µfd, 10v (±20%)	58	5733-12060-01		Fuse Holder, F101-F118
28	5040-09421-00	C2	Capacitor, 100µfd, 25v (+50, -10%)	59	Not Used		
29	5040-09537-00	C8	Capacitor, 100µfd, 100v (±20%)	60	5791-10862-03	J108, J119, J136	Connector, 3-pin Header STR Sq.
30	5040-12313-00	C5, C6, C7, C11, C30	Capacitor, 15,000µfd, 25v (±20%)	61	5791-10862-04	J103, J116-J118	Connector, 4-pin Header STR Sq.
31	5043-08980-00	B-BYPASS	Capacitor, .01µfd, 50v (+80, -20%)	62	5791-10862-05	J112, J104-J106, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header STR Sq.
				63	5791-10862-06	J107	Connector, 6-pin Header STR Sq.
				64	5791-10862-07	J101, J109, J114	Connector, 7-pin Header STR Sq.
				65	5791-10862-09	J102, J110, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header STR Sq.
				66	5791-10862-11	J120, J121	Connector, 11-pin Header STR Sq.
				67	5791-10862-12	J115	Connector, 12-pin Header STR Sq.
				68	5791-10862-13	J126	Connector, 13-pin Header STR Sq.
				69	5791-12461-05	J111	Connector, 5-pin Header STR Sq.
				70	5791-12461-09	J133-J135	Connector, 9-pin Header STR Sq.
				71	5791-12516-00	J113	34 HEN 2x17 STR
				72	5824-09248-00	TP1-TP8	Test Point #1502-1
				73	5041-09163-00	C9	Capacitor, 2.2µfd TANT
				74-100	Not Used		
				101	Not Used		
				102	5730-09071-00	F114	Fuse, 8A, 32v
				103	Not Used		
				104	5731-09432-00	F112	Fuse, S-B, 7A., 250v
				105	5731-09651-00	F106 - F111, F113	Fuse, S-B, 5A., 250v
				106	Not Used		
				107	5731-10356-00	F101 - F105, F116	Fuse, S-B, 3A., 250v
				108	5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
				109	5705-12698-00		Heatsink #62365
				110	4010-01006-00		Mach. Screw, 10-32 x 5/8

WPC Power Driver Assembly

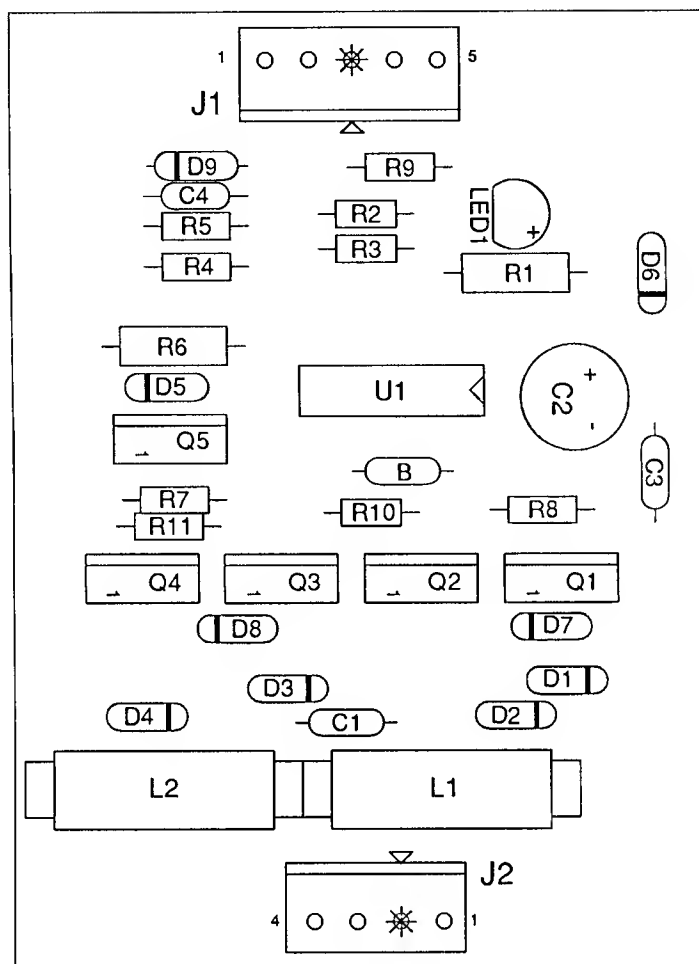


A-14039**Dot Matrix Controller Assembly**

Part Number	Ckt Designator	Description
5010-08991-00	R1	Resistor, 4.7K Ω , 1/4w, 5%
5010-09224-00	R10	Resistor, 270 Ω , 1/4w, 5%
5010-12832-00	R3, R6, R12, R13	Resistor, 47K Ω , 1/2w, 5%
5010-12841-00	R4, R5	Resistor, 120 Ω , 1/2w, 5%
5012-12830-00	R9	Resistor, 1.8K Ω , 5w, 5%
5012-12842-00	R11	Resistor, 120 Ω , 5w, 5%
5012-12843-00	R8	Resistor, 4.7K, 5w, 5%
5010-10171-00	R7	Resistor, 56 Ω , 1/4w, 5%
5040-08986-00	C3	Capacitor, 100 μ fd., 10v, (\pm 20%)
5040-12324-00	C4, C7	Capacitor, 150 μ fd., 160v, (\pm 50%)
5043-08980-00	BYPASS	Capacitor, .01 μ fd., 50v, (+80, -20%)
5043-09072-00	C6, C9, C10	Capacitor, .1 μ fd., 500v, (+80, -20%)
5043-09845-00	C1, C2, C11	Capacitor, 1KP, 50v, (\pm 20%)
5043-09492-00	C5, C8	Capacitor, 100P, 50v, (\pm 10%)
5070-09054-00	D7	Diode, 1N4004, 1.0A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v
5075-12823-00	D4, D5	Zener, 1N4758A, 62v
5075-12826-00	D3	Zener, 1N4759A, 62v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A.
5160-10269-00	Q1	Transistor, 2N3904 NPN
5164-09056-00	Q2, Q10	Transistor, MPSD02, NPN
5164-12154-00	Q3, Q7	Transistor, MJE15030 NPN
5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
5194-12155-00	Q6	Transistor, MJE15031 PNP
5281-09738-00	U16, U25 - U27	IC, 74LS157
5281-10033-00	U3	IC, 74LS30
5281-10043-00	U31 - U33, U35	IC, 74LS175
5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5311-10947-00	U9	IC, 74HC125
5311-10951-00	U10, U11	IC, 74HC161
5311-10977-00	U6	IC, 74HC04
5311-12817-00	U29	IC, 74HC165
5311-12819-00	U21	IC, 74HC688
5311-12820-00	U23	IC, 74HC27
5311-12822-00	U13 - U15	IC, 74HC193
5315-12009-00	U22	IC, 74HCT374
5315-12812-00	U1, U2, U30	IC, 74HCT138
5281-09308-00	U28	IC, 74HCT245
5315-12815-00	U8, U34	IC, 74HCT08
5315-12816-00	U19	IC, 74HCT32
5315-12821-00	U7	IC, 74HCT240
5340-12278-00	U24	S/RAM 2064 150NS
5551-09822-00	L1	IND 4.7 μ H, 3.0A.
5671-09019-00	D10	Display LED Red
5705-09199-00	Q3, Q6, Q7	Heatsink 6030B
5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5733-12060-00		Fuse Holder (F601, F602)
5791-10850-00	J602	Connector, 26-pin STR Sq.
5791-10862-05	J605	Connector, 5-pin Header Sq.
5791-10862-07	J606	Connector, 7-pin Header Sq.
5791-10862-08	J604	Connector, 8-pin Header Sq.
5791-12516-00	J601	34 Hen 17x2 STR
5791-12827-00	J603	14 Hen 7x2 STR
5010-09036-00	R14-R23	Resistor, 100 Ω , 1/4w, 5%
4006-01003-06	Q3, Q6, Q7	Mach. Screw, 6-32 x 3/8
4406-01128-00	Q3, Q6, Q7	Nut, 6-32 KEPS

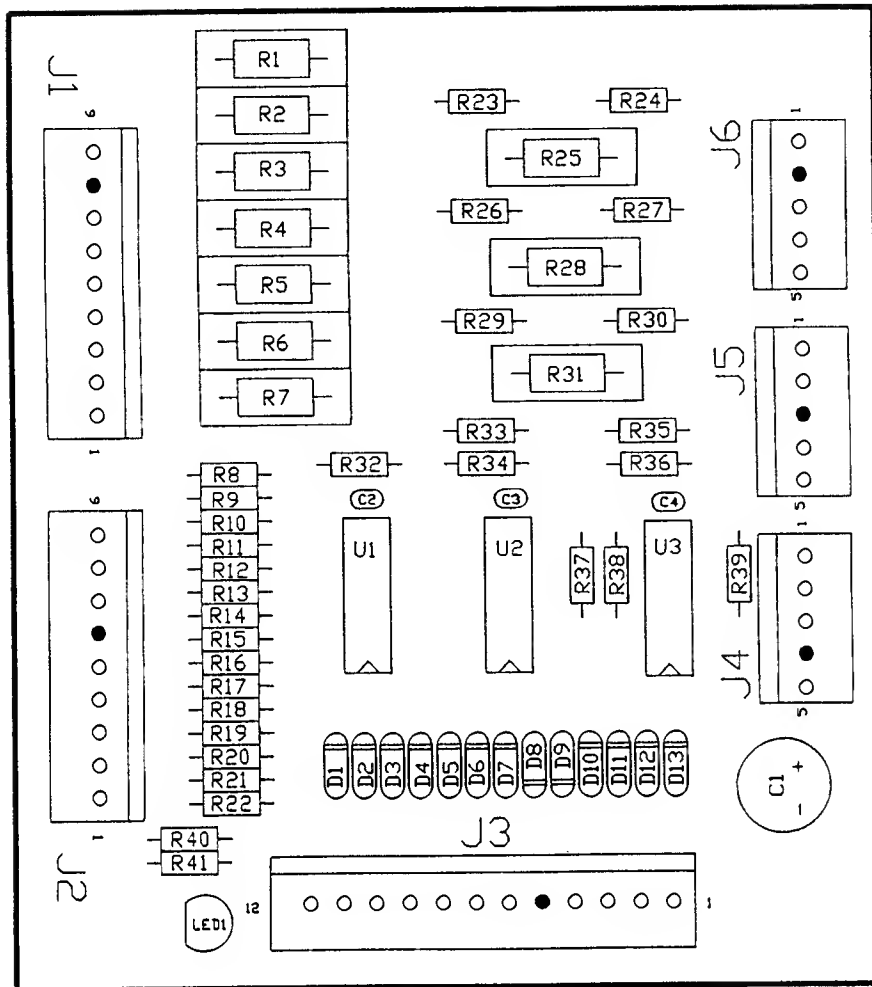


A-15680 Bi-Directional Motor Drive Assembly



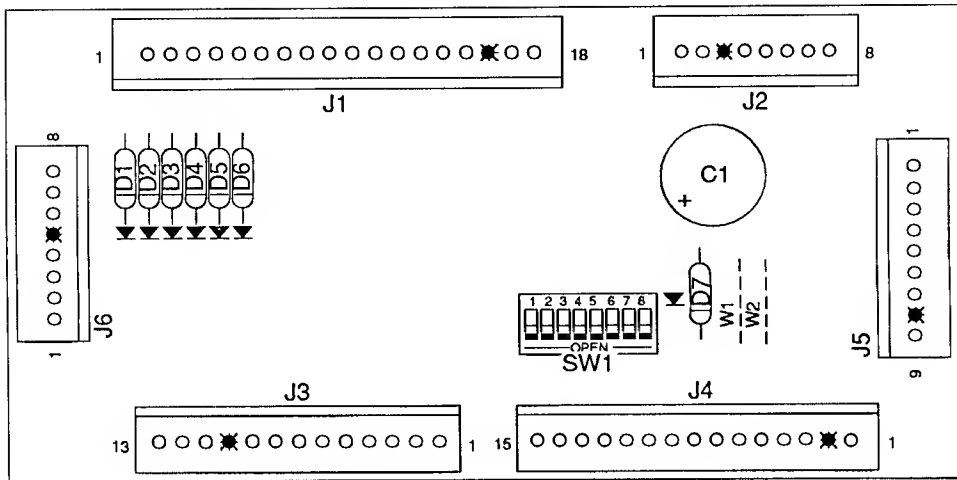
Part Number	Designator	Description
5162-12635-00	Q1, Q3, Q5	Transistor TIP 102 NPN
5192-12428-00	Q2, Q4	Transistor TIP 107 PNP
5370-12272-00	U1	I.C. LM339 Quad Comp
5551-09822-00	L1,L2	Ind. 4.7 $\mu\Omega$
5791-12273-04	J2	Connector, 4-pin Header Str Sq. LCK .156
5791-12273-05	J1	Connector, 5-pin Header Str Sq. LCK .156
5070-09054-00	D1 - D9	Diode 1N4004, 1.0A.
5043-08996-00	C1	Capacitor, 0.1 μ fd (\pm 20%)
5040-10974-00	C2	Capacitor, 100 μ fd, 35v (+80, -20%)
5043-08980-00	C3, B, C4	Capacitor, 0.01 μ fd, 50v (+1, -20%)
5010-09085-00	R2, R3, R9	Resistor, 1.5K Ω , 1/4w, 5%
5010-09034-00	R4, R5	Resistor, 10K Ω , 1/4w, 5%
5010-08991-00	R7, R8, R10, R11	Resistor, 4.7K Ω , 1/4w, 5%
5010-09061-00	R1, R6	Resistor, 680 Ω , 1/2w, 5%
5671-09019-00	LED1	Display LED Red

A-15430 10-Switch Opto Board



Part Number	Designator	Description
5040-10974-00	C1	Capacitor, 100μfd, 35v (+80, -20%)
5043-08980-00	C2 - C4	Capacitor, 0.01μfd, 50v (+1, -20%)
5671-09019-00	LED1	Display LED 1 Red
5370-12272-00	U1 - U3	IC LM339 Quad
5070-09054-00	D1 - D13	Diode 1N4004 1.0A.
5010-12928-00	R1 - R7, R25, R28, R31	Resistor, 270Ω, 2w, 5%
5010-09999-00	R8 - R21, R23, R24, R26, R27, R29, R30	Resistor, 2KΩ, 1/4w, 5%
5010-09314-00	R22	Resistor, 1.2KΩ, 1/4w, 5%
5010-09162-00	R32, R35, R39, R40, R41	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R33, R34, R36	Resistor, 22KΩ, 1/4w, 5%
5010-09034-00	R37, R38	Resistor, 10KΩ, 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header STR Sq. Pin .156
5791-10862-09	J1, J2	Connector, 9-pin Header STR Sq. Pin .156
5791-10862-05	J4 - J6	Connector, 5-pin Header STR Sq. Pin .156

A-14689 WPC Coin Door Interface Board

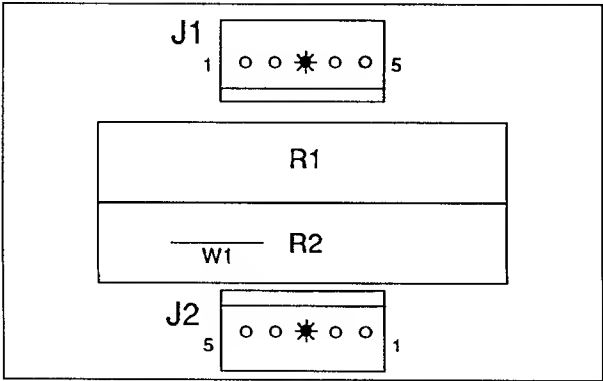


Part Number	Designator	Description
5070-09054-00	D1-D7	Diode, 1N4004, 1.0A.
5791-10862-18	J1	Connector, 18-pin Header Str Sq.
5791-10862-08	J2, J6	Connector, 8-pin Header Str Sq.
5791-10862-13	J3	Connector, 13-pin Header Str Sq.
* 5791-10862-15	J4	Connector, 15-pin Header Str Sq.
* 5791-10862-09	J5	Connector, 9-pin Header Str Sq.
* 5645-09025-00	SW1	Switch DIP 8-Position

Notes:

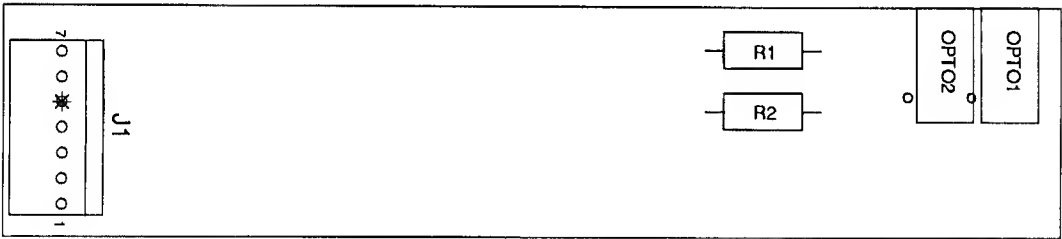
1. For Belgium, France, Finland, Sweden and England use A-14689-1 Coin Door Interface Board.
2. * = Used on Electronic Coin Door only.

A-15309-1 2-10W Resistor PCB Assembly



Part Number	Designator	Description
5012-13138-00	R1	Resistor, 1Ω, 10W, 5%
5010-09534-00	R2	Resistor, 0Ω Jumper
5791-10862-05	J1, J2	Connector, 5-pin Header
03-8022-1	-	Spacer

A-15894 Flipper Opto Board



Part Number	Designator	Description
5010-08930-00	R1, R2	Resistor 470Ω, 1/2w, 5%
5490-12451-00	OPTO1, OPTO2	Opto Inter Lg. 10ma.
5791-12273-07	J1	Connector, 7-pin Header

A-15205-R-4**Fliptronic II Flipper Assembly (Lower Right)****A-15205-L-4****Fliptronic II Flipper Assembly (Lower Left)**

Item	Part Number	Description
1.	B-13104-R	Flipper Base Assy, Right
	* B-13104-L	Flipper Base Assy, Left
2.	SW-1A-193	Switch Assembly
3.	4701-00002-00	Lockwasher, #6 Split
4.	4105-01019-10	Sh. Metal Screw, #5 x 5/8 P-RH-A
5.	4008-01079-05	Mach. Screw, 8-32 x 5/16 H-SOC
6.	4701-00003-00	Lockwasher, #8 Split
7.	01-9375	Switch Mounting Bracket
8.	20-6516	Speednut, Tinnerman
9.	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
10.	4701-00004-00	Lockwasher, #10 Split
11.	A-12111	Flipper Stop Assembly
12.	FL-15411	Flipper Coil (Orange)
a)	03-7066-5	Coil Tubing
13.	01-7695	Solenoid Bracket
14.	4006-01017-04	Mach. Screw, 6-32 x 1/4 P-RH-S
15.	10-364	Spring
16.	B-13882-R	Crank Link Assembly, Right
	* B-13882-L	Crank Link Assembly, Left
a)	B-13884-R	Flipper Crank Assembly, Right
	* B-13884-L	Flipper Crank Assembly, Left
b)	A-10656	Flipper Link Assembly
c)	02-4179	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8 SH
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
17.	23-6577	Bumper Plug, 5/8"
18.	03-7568	Flipper Bushing
19.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH
20.	4406-01117-00	Nut, 6-32 Hex.

Associated Parts for Left & Right Flippers:

21.	23-6678-7	Flipper Rubber (Red)
22.	20-9734-6	Flipper & Shaft (Yellow)

Notes:

- * Items for Left Flipper Assembly ONLY.
- Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
- With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 (±.015) inch. When flipper is activated switch must close.
- Any adjustment of the E.O.S. Switch must be made at a minimum distance of 0.25 inch from the switch body.
- Longer blade of E.O.S. Switch must be straight. Gap adjustment is done by adjusting shorter blade.
- All moving elements of the assembly must operate freely without any evidence of binding.
- Apply Loctite™ 242 when reattaching screws to the Flipper Stop Assy, the Solenoid Bracket, and the Flipper Bushing.

A-16090-L-4**Flipper Assembly (Upper Left)**

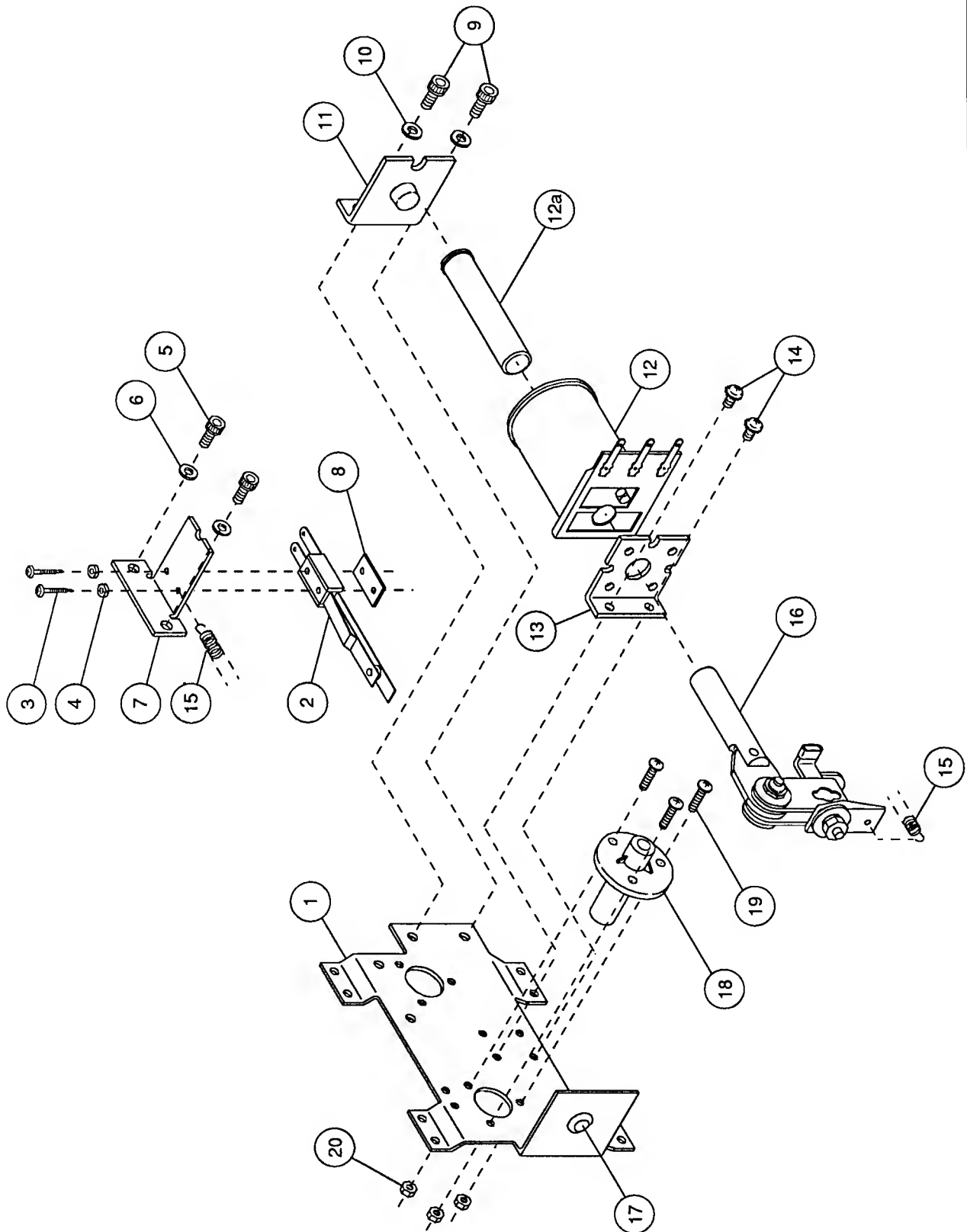
(Parts listed replace same items of A-15205-R-4)

Item	Part Number	Description
1.	A-16091-L	Flipper Base Assy, Left

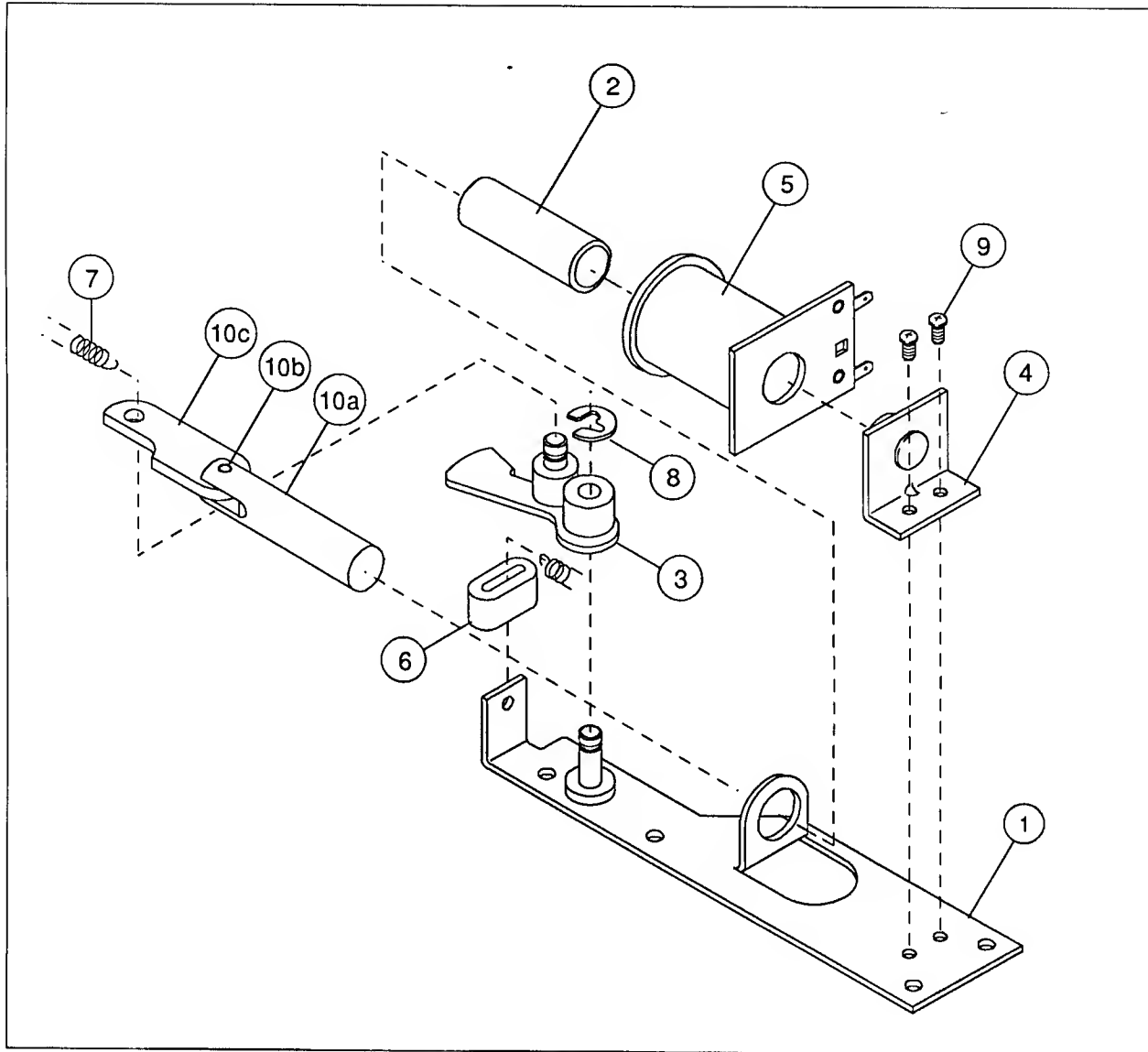
Associated Part:

22.	20-9250-6	Flipper & Shaft (Yellow)
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**A-15205-R-4, A-15205-L-4 & A-16090-L-4
Fliptronic II Flipper Assembly**

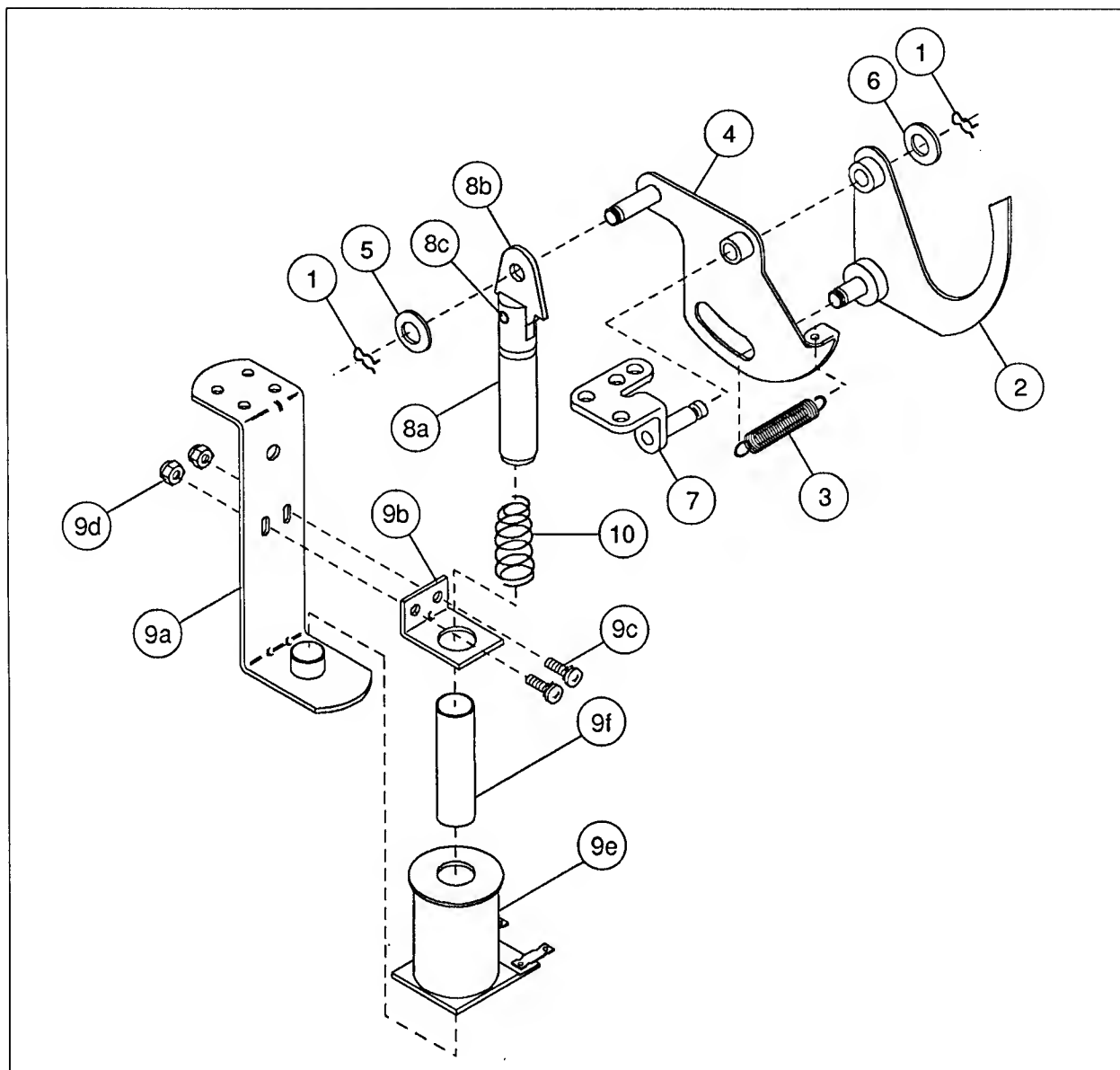


A-8039-3 Outhole Kicker Assembly



Item	Part Number	Description
1.	A-6378	Mounting Plate Assembly
2.	03-7066	Coil Tubing
3.	A-6889	Kicker Lever Assembly
4.	A-8038	Coil Stop Assembly
5.	AE-27-1200	Coil Assembly
6.	03-7176-1	Striker Ring
7.	10-101-4	Spring-Reset
8.	20-8712-25	"E" Ring, 1/4" Shaft
9.	4006-01003-03	Mach. Screw, 6-32 x 3/16"
10.	A-8335	Coil Plunger Assembly
a)	02-2364	Coil Plunger
b)	20-8716-5	Roll Pin, 1/8 x 7/16"
c)	01-4251	Ball Return Link

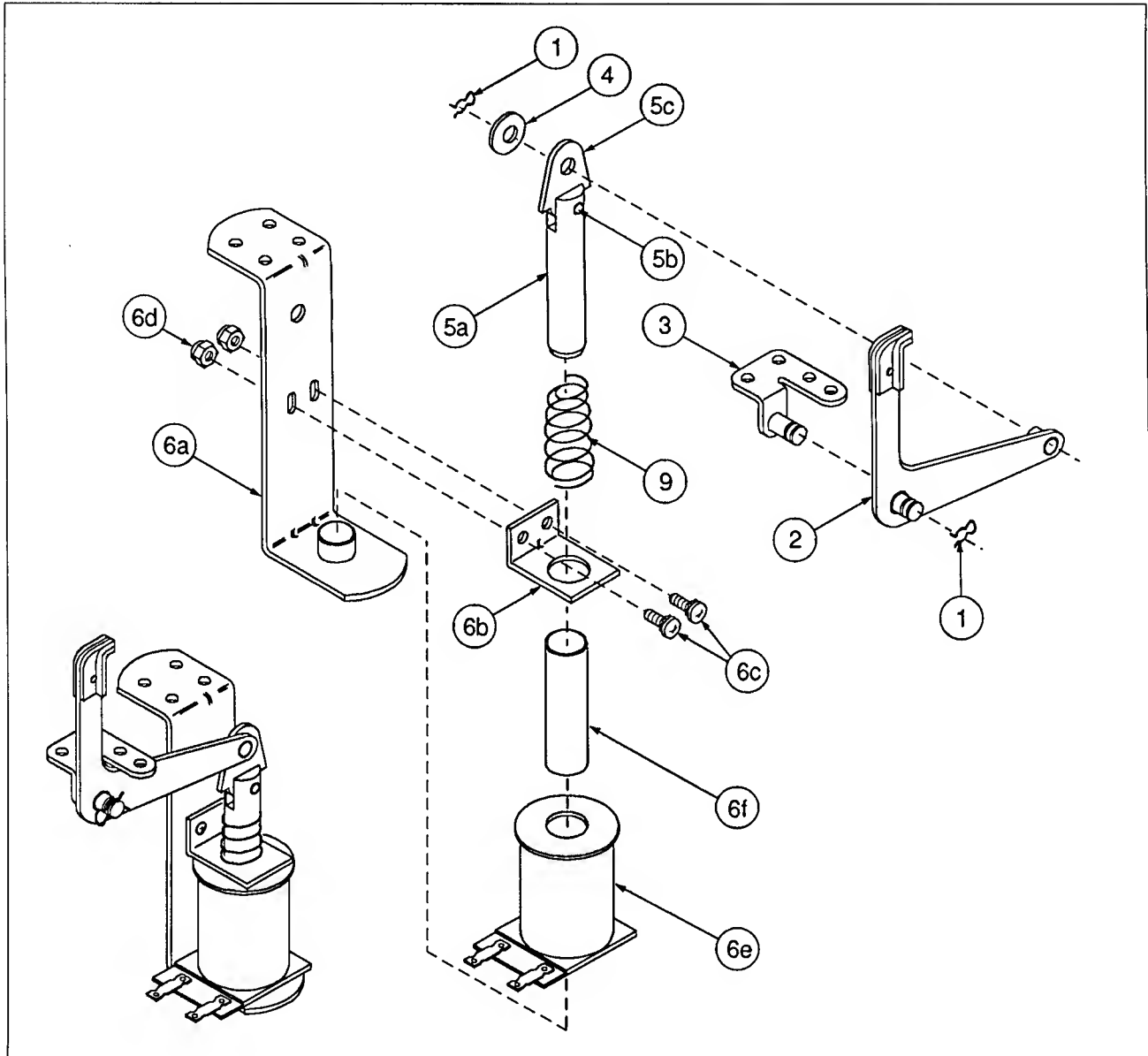
C-9638 Ball Shooter Lane Feeder Assembly



Associated Parts:

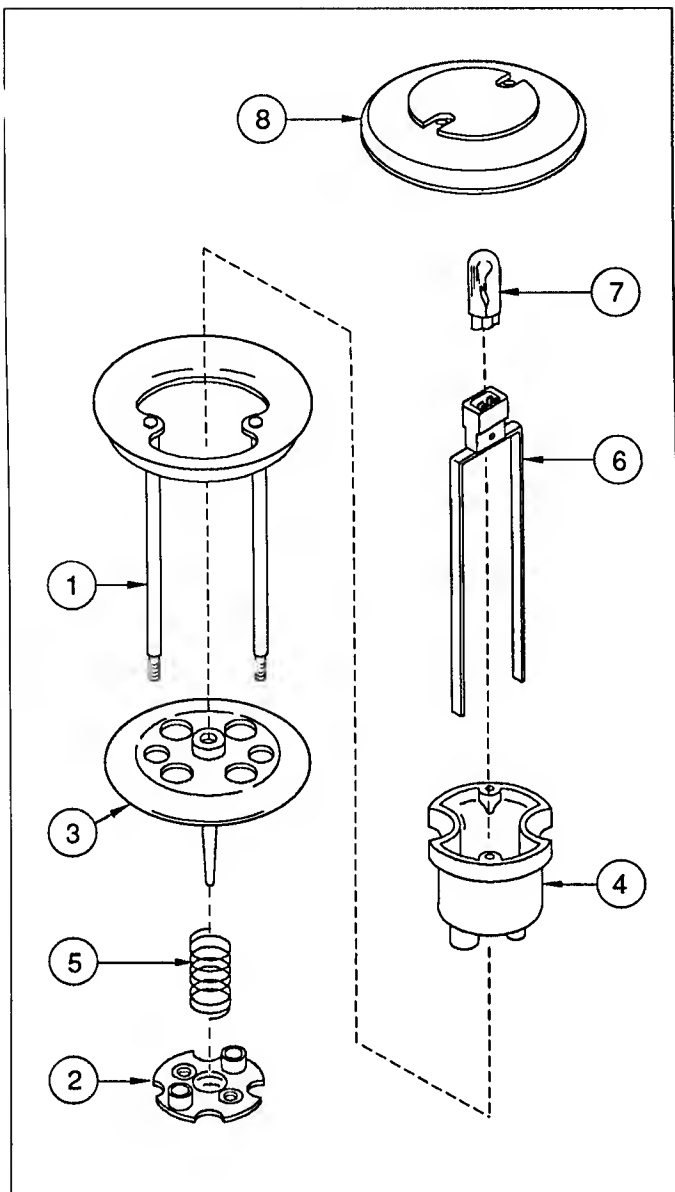
Item	Part Number	Description	Item	Part Number	Description
1.	12-6227	Hairpin Clip	9.	B-9362-L-2	Coil & Bracket Assembly
2.	A-8247	Eject Cam Assembly	a)	B-7572-1	Bracket & Stop Assembly
3.	10-362	Ejector Spring (Plain)	b)	01-8-508-S	Coil Retaining Bracket
4.	A-6949-L	Spring Plate Assembly	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
5.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.	d)	4406-01119-00	Nut, 6-32 ESN
6.	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28ga.	e)	AE-26-1200	Coil Assembly
7.	A-8268	Mounting Bracket Assembly	f)	03-7066	Coil Tubing
8.	A-8050-1	Coil Plunger Assembly	10.	10-128	Spring
a)	02-3407-2	Coil Plunger Assy, 2-1/8"			
b)	03-8085	Armature Link			
c)	20-8716-5	Roll Pin, 1/8 x 7/16"			

B-12665 Kicker Arm (Slingshot) Assembly



Associated Parts for Right & Left Kickers

Item	Part Number	Description	Item	Part Number	Description
1.	12-6227	Hairpin Clip	6.	B-11203-R-1	Coil & Bracket Assembly
2.	A-12664	Kicker Crank Assembly	a)	B-7572-1	Bracket & Stop Assembly
3.	A-5653	Mounting Bracket Assembly	b)	01-8-508-S	Coil Retaining Bracket
4.	47C0-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
5.	A-5103	Coil Plunger Assembly	d)	4406-01119-00	Nut, 6-32 ESN
a)	02-2364	Coil Plunger	e)	AE-26-1500	Coil Assembly
b)	03-8085	Armature Link	f)	03-7066	Coil Tubing
c)	20-8716-5	Roll Pin, 1/8 x 7/16"			
			7.	10-128	Spring

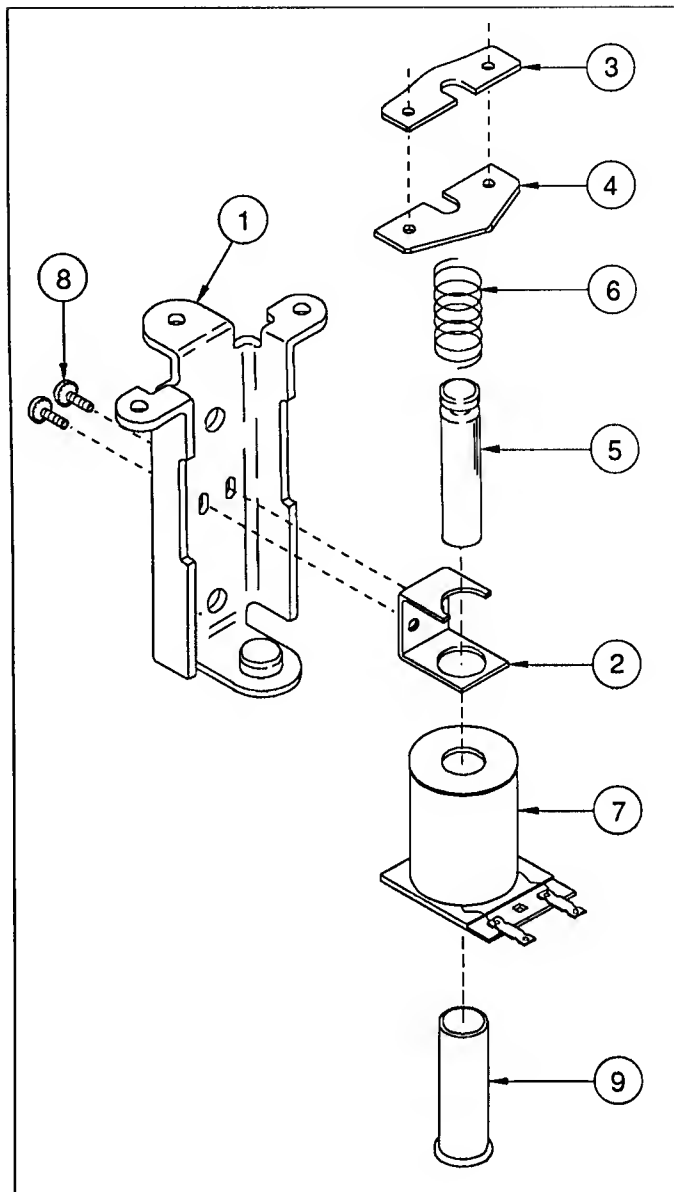


B-9414-3 Jet Bumper Assembly

Item	Part Number	Description
1.	A-4754	Bumper Ring Assembly
2.	03-6009-A5	Bumper Base, White
3.	03-6035-4	Bumper Wafer, Red
4.	03-7443-5	Bumper Body, White
5.	10-7	Spring
6.	24-8776	Socket - Wedge Base
7.	24-8768	Bulb #555 (6.3V., 0.25A.)

Associated Parts:

8.	03-8254-9	Jet Bumper Cap, Trans. Red (3)
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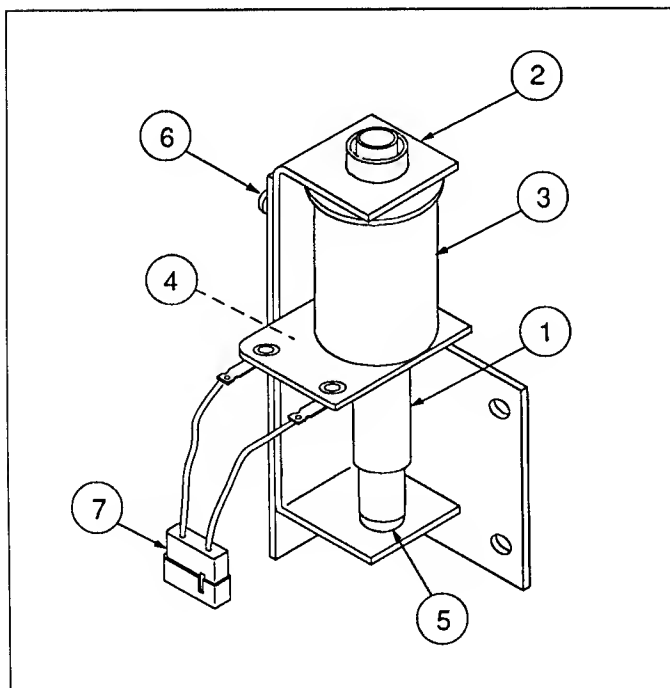
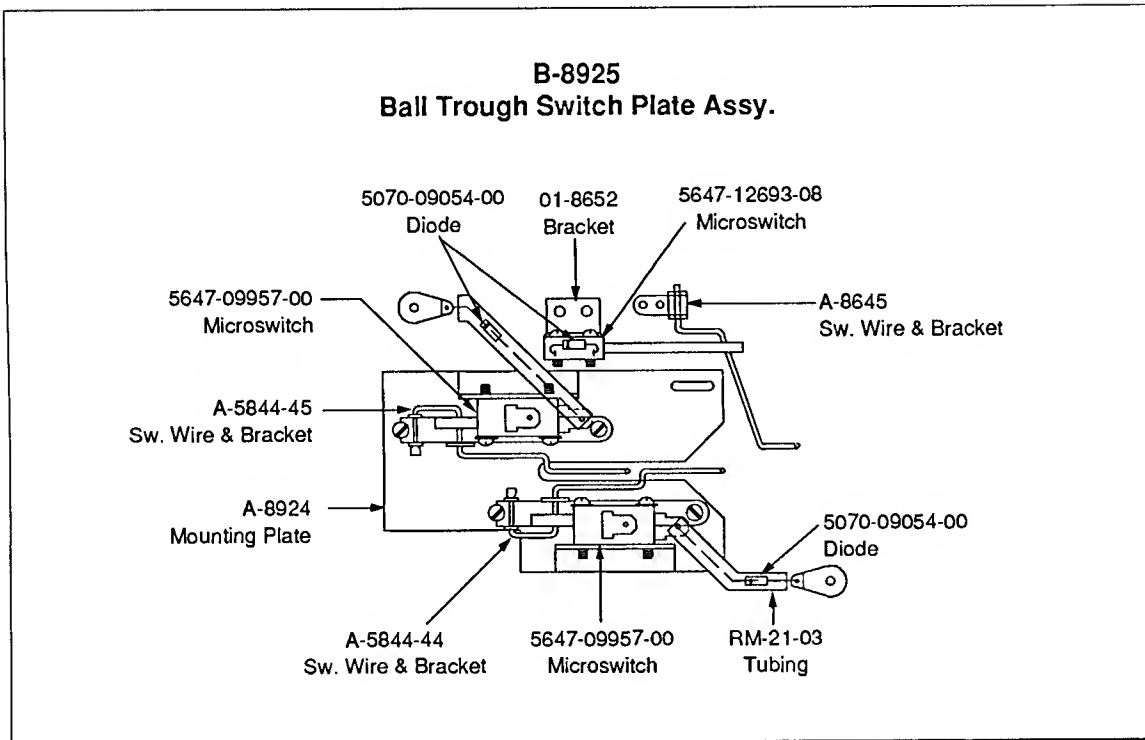


A-9415-2 Jet Bumper Coil Assembly

Item	Part Number	Description
1.	B-7417	Bracket & Stop Assembly
2.	01-1747	Coil Retaining Bracket
3.	01-5492	Armature Link, Steel
4.	01-5493	Armature Link, Bakelite
5.	02-3406-1	Coil Plunger
6.	10-326	Armature Spring
7.	AE-26-1200	Coil Assembly
8.	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9.	03-7066	Coil Tubing

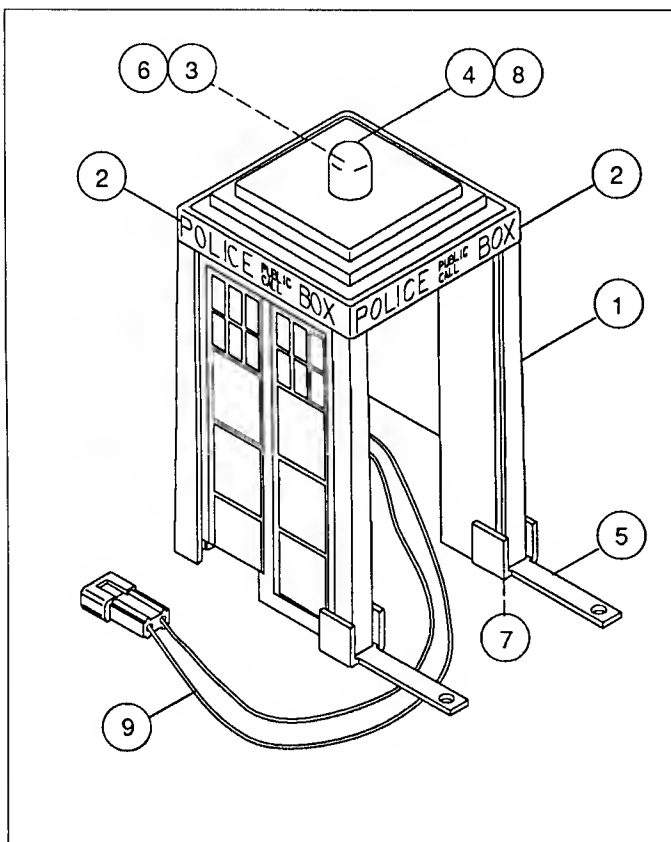
Ball Trough Switches

(Viewed from underside of playfield to show locations)



B-10686-1 Kicker Assembly

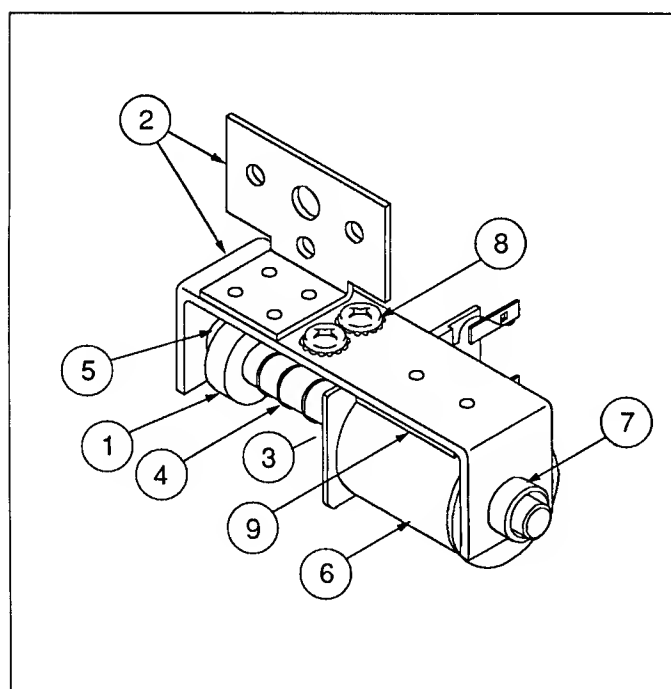
Item	Part Number	Description
1.	A-5387	Coil Plunger Assembly
2.	B-7409-2	Mtg. Bracket Assembly
3.	AE-23-800	Coil Sub-Assembly
4.	01-8-508-T	Coil Retaining Bracket
5.	23-6420	Rubber Grommet
6.	4008-01017-06	Mach. Screw, 8/32 x 3/8
7.	H-11835	Kicker Cable
8.	03-7067-5	Coil Tubing



A-15647 Tardis Box Assembly

Item	Part Number	Description
1.	03-8659	Tardis Box
2.	*31-1688	Decal
3.	24-8821	Socket Assembly
4.	24-8768	Bulb #555, 6.3v
5.	01-10748	Mounting Bracket
6.	4104-01001-06	Sh. Metal Screw, #4 x 3/8 P-PH
7.	4104-01042-08	Sh. Metal Screw, #4 x 1/2 P-FH
8.	03-8063-1	Light Bulb Sleeve
9.	H-15512	Cable Assembly

* Not available for individual sale. Order Decal Set (31-1688)



A-15720 Kicker Bracket Assembly

Item	Part Number	Description
1.	A-6306-2	Bell Armature Assembly
2.	A-14526	Mounting Bracket Assembly
3.	01-8-508-T	Solenoid Bracket
4.	10-135	Solenoid Spring
5.	23-6420	Rubber Grommet
6.	AE-26-1200	Coil Assembly
7.	03-7067-5	Coil Tubing
8.	4008-01017-04	Mach. Screw, #8-32 x 5/16 P-RH
9.	03-8523	Insulator

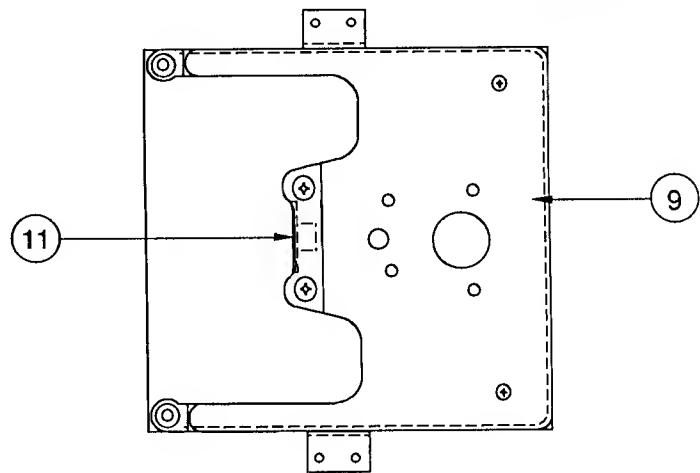
20006-PL-UP Mini-Playfield Assembly

Item	Part Number	Description
1.	A-15581	Main Support Bracket
2.	01-10671	Ball Guide (2)
3.	A-15356	3-Door Assembly
4.	A-15634	Motor & Cam Assembly
5.	A-15358	Ball Popper Assembly
6.	A-15358-1	Ball Popper Assembly
7.	A-15500	5-Target Assembly
8.	A-15551	Flap Assembly
9.	A-15582	Mini-Playfield Cover Assembly
10.	A-15897	Opto & Cable Assembly
11.	A-15903	Standup Target & Decal Assembly
12.	01-10644-L	Ball Guide, Left
13.	01-10644-R	Ball Guide, Right
14.	01-10646-L	Ball Deflector, Left
15.	01-10646-R	Ball Deflector, Right

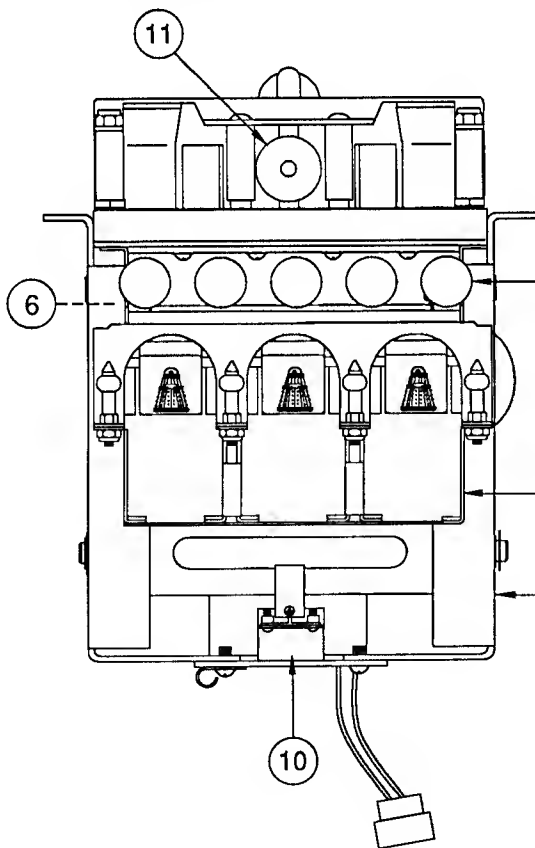
Not Shown:

A-8882	Light Socket Assembly w/Diode (2)
A-11905	Socket & Bulb Assembly (3)
H-15514	Mini Playfield Cable
H-15593	Motor Cable
02-4426-2	Post Fastener #8WS 6-32 (2)
02-4342-1	Post 8-32 Threaded (2)
02-4576	Roller Cam
02-4659	Post #10 (2)
03-7520-2	Ty-Wrap Nylon (2)
02-4252-10	F-F Spacer, 6-32 x 5/8
03-8365-9	Post # 8 Transparent (2)
20-8712-37	"E"-Ring 3/8" Shaft
23-6556	Rubber Bumper Sleeve, Black (4)
36-20006-1	Hardcoat Mini-Playfield
4104-01020-08	Sh. Metal Screw, #4 x 1/2 (4)
4106-01115-06Y	Sh. Metal Screw #6x3/8 (3)
4106-01033-08	Sh. Metal Screw, #6 x 1/2 (8)
4700-00021-00	Flatwasher, 13/64 x 7/16 x 21ga. (2)
4408-01119-01	Nut 8-32 ESNA/NTM (2)
4006-01027-06	Mach. Screw, 6-32 x 3/8 (4)
4406-01119-00	Nut 6-32 ESN (2)
4008-01017-10	Mach. Screw, 8-32 x 5/8 (4)
4006-01003-08	Mach. Screw, 6-32 x 1/2 (4)

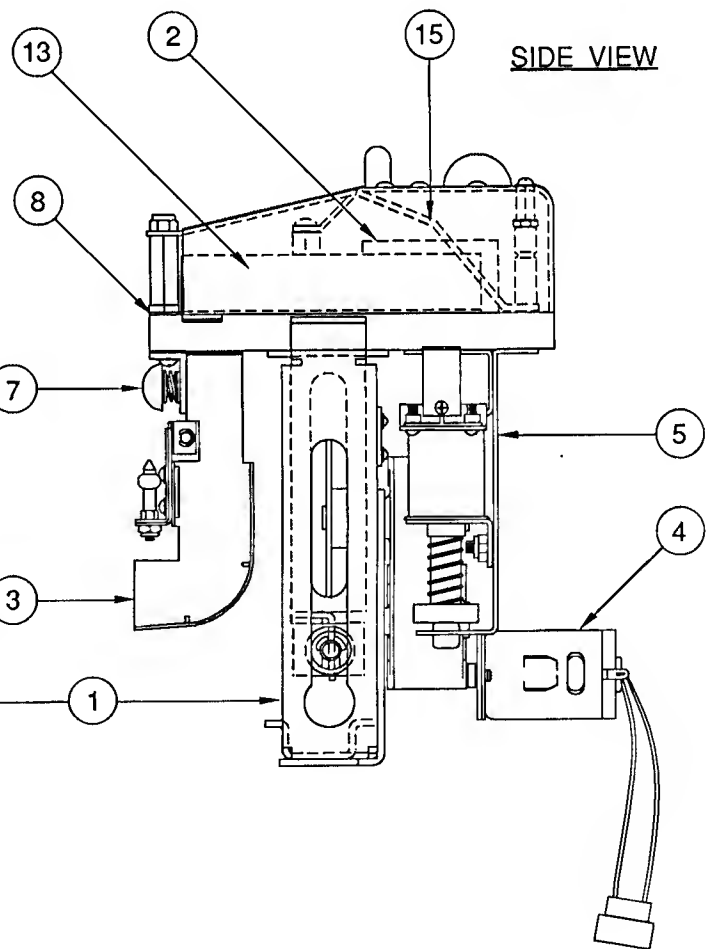
TOP VIEW

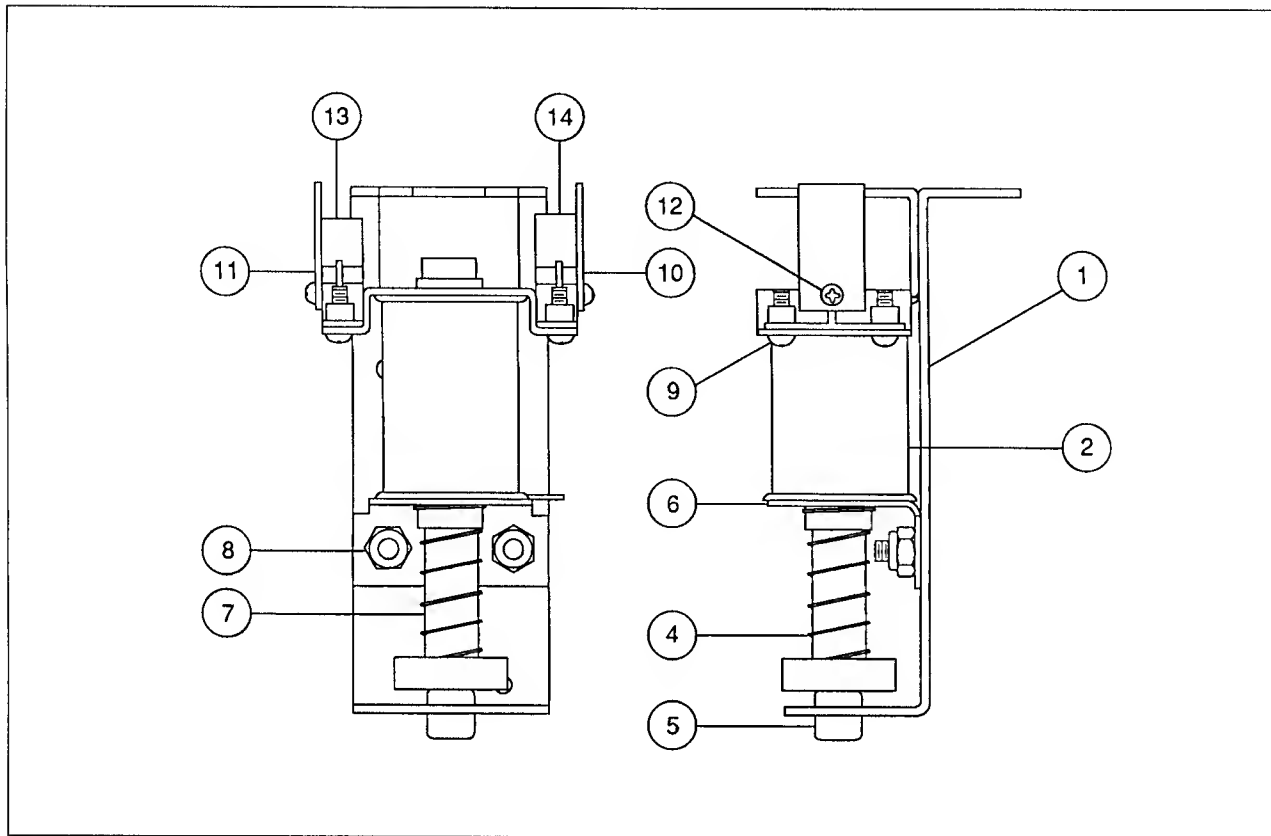


FRONT VIEW



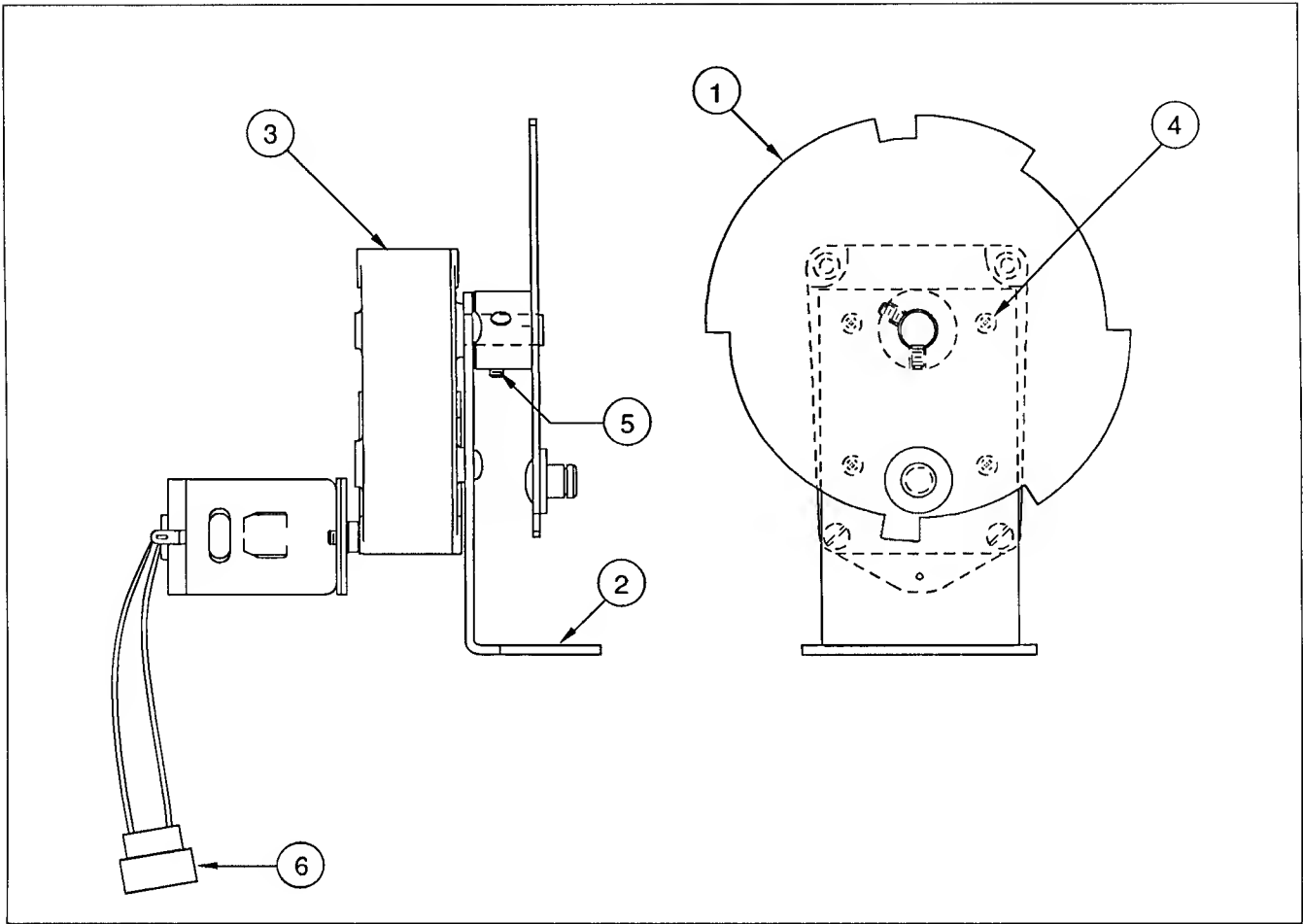
SIDE VIEW



A-15358 & A-15358-1**Ball Popper Assembly**

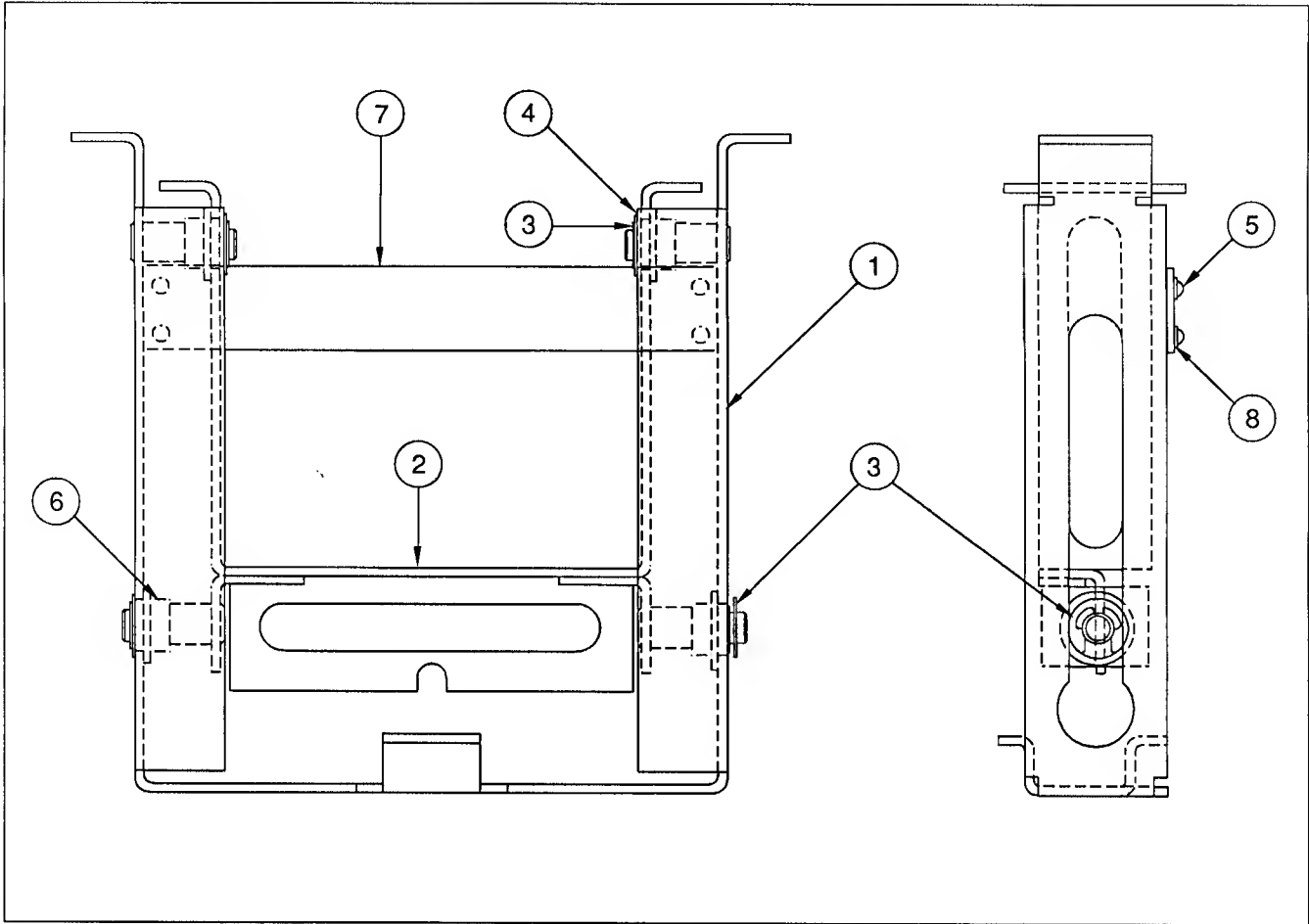
Item	Part Number	Description
1.	A-15359	Bracket Sub-Assembly
2.	AE-26-1500	Coil Assembly
3.	03-7067	Coil Tubing
4.	10-135	Solenoid Spring
5.	23-6420	Rubber Grommet
6.	01-10895	Coil Mounting Bracket
7.	A-13270	Bell Armature Assembly
8.	4408-01119-00	Nut 8-32 ESN
9.	4106-01004-06	Sh. Metal Screw #6 x 3/8 P-PH-ST
10.	A-14231	LED Assembly
11.	A-14232	Photo Trans. Assembly
12.	4104-01001-06	Sh. Metal Screw #4 x 3/8 P-PH
13.	03-8506	Opto Mounting Base, Black
14.	03-8506-1	Opto Mounting Base, White

A-15634 Motor & Cam Assembly



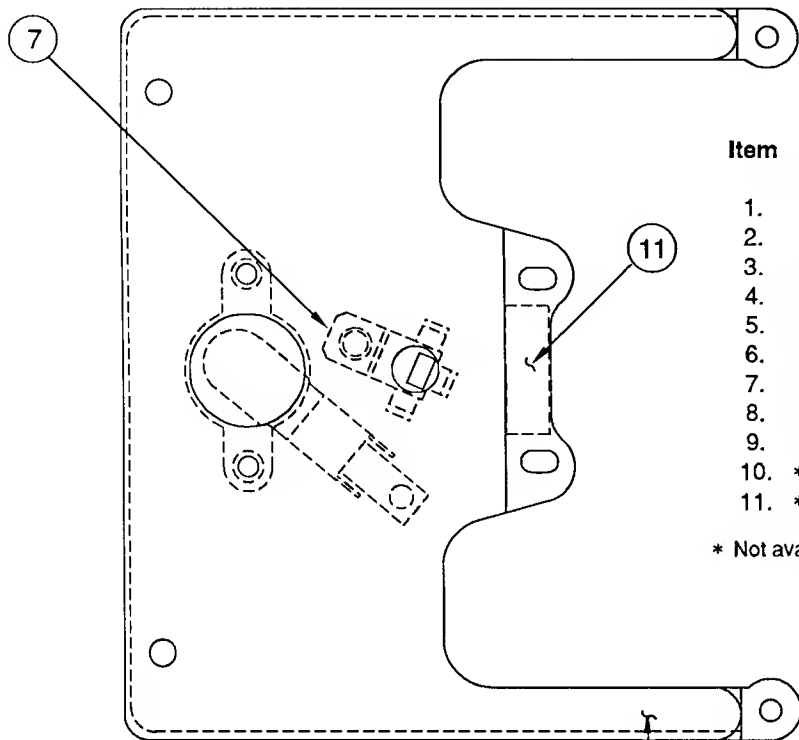
Item	Part Number	Description
1.	A-15035	Cam Assembly
2.	01-10421	Motor Mounting Bracket
3.	14-7970	Motor, 20v
4.	4008-01005-06	Mach. Screw, #8-32 x 3/8 P-PH
5.	4323-01158-06	Set Screw, 1/4-28 x 1/4 SH-KN-CP
6.	H-15593	Motor Cable

A-15581 Main & Support Bracket Assembly



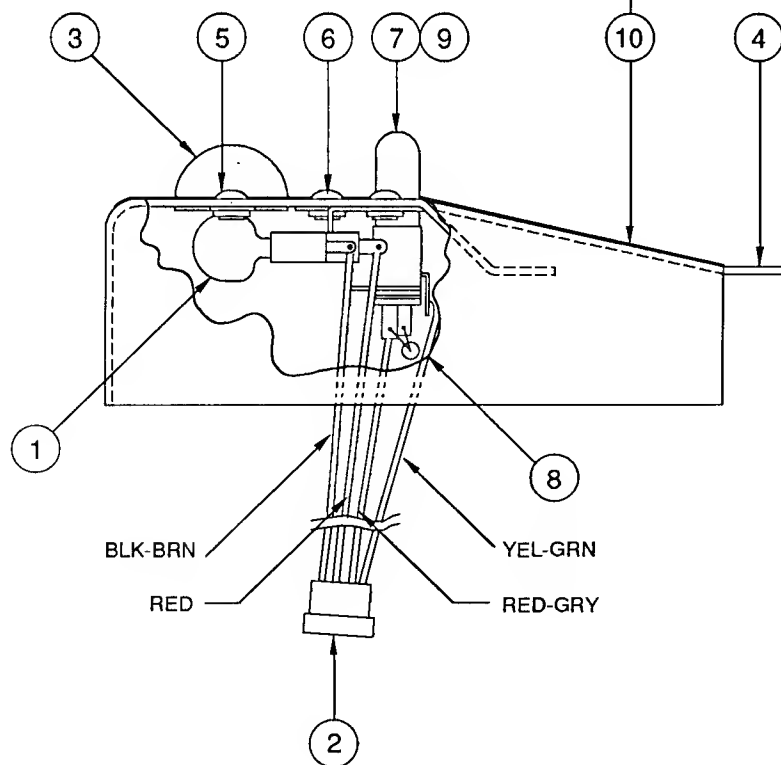
Item	Part Number	Description
1.	A-15036	Support Bracket
2.	A-15037	Main Bracket
3.	20-8712-37	"E"-Ring 3/8" Shaft
4.	4700-00131-00	Flatwasher, 3/8 x 7/8 x 16ga.
5.	4006-01027-06	Mach. Screw, 6-32 x 3/8
6.	02-4579	Roller w/Flange
7.	01-10642	Plate Adjustment
8.	4701-00002-00	Flatwasher #6 Split

A-15582 Mini-Playfield Cover Assembly

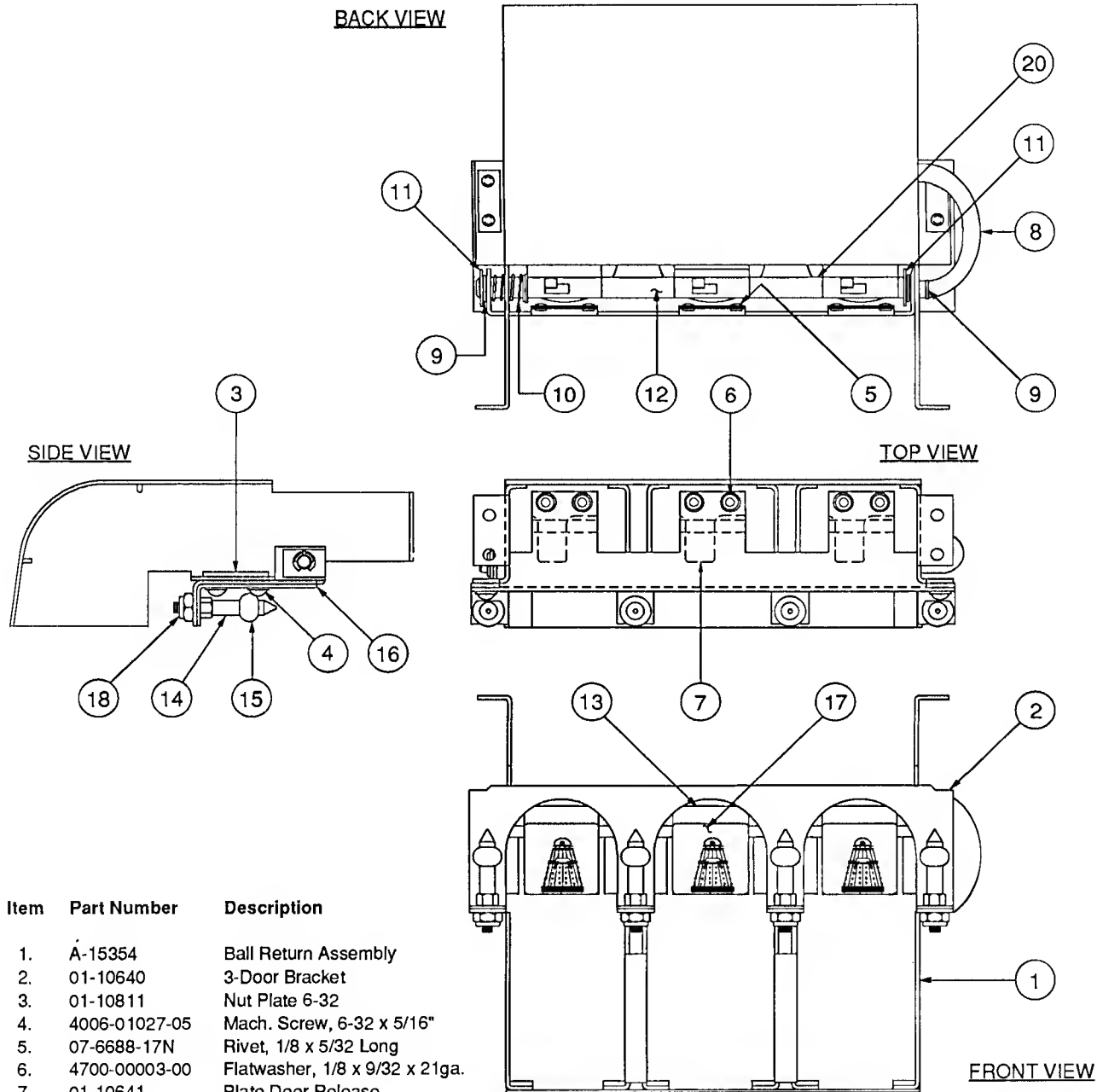


Item	Part Number	Description
1.	A-12336-1	Socket & Bulb Assy.
2.	H-15594	Lamp Cable
3.	03-8662-9	Mini Dome
4.	03-8666	Cover
5.	07-6688-19N	Rivet, 1/8 x 7/32
6.	07-6688-18N	Rivet, 1/8 x 3/16"
7.	A-16041	Bulb & Light Socket Assy.
8.	5070-09054-00	Diode 1N4004
9.	03-8063-6	Sleeve
10.	*31-1688-1	Decal
11.	*31-1688-2	Decal

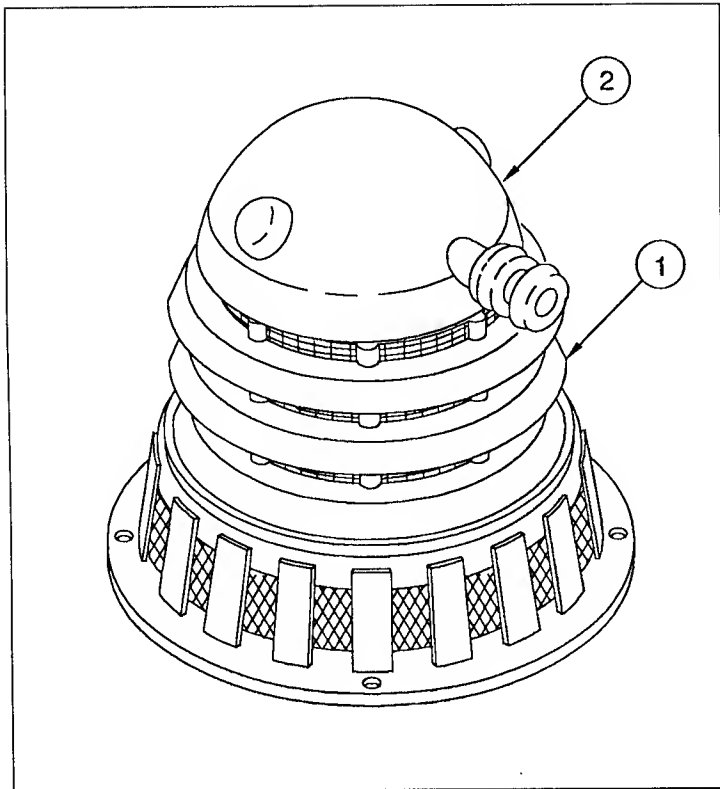
* Not available for individual sale. Order Decal Set 31-1688.



A-15356 3-Door Assembly

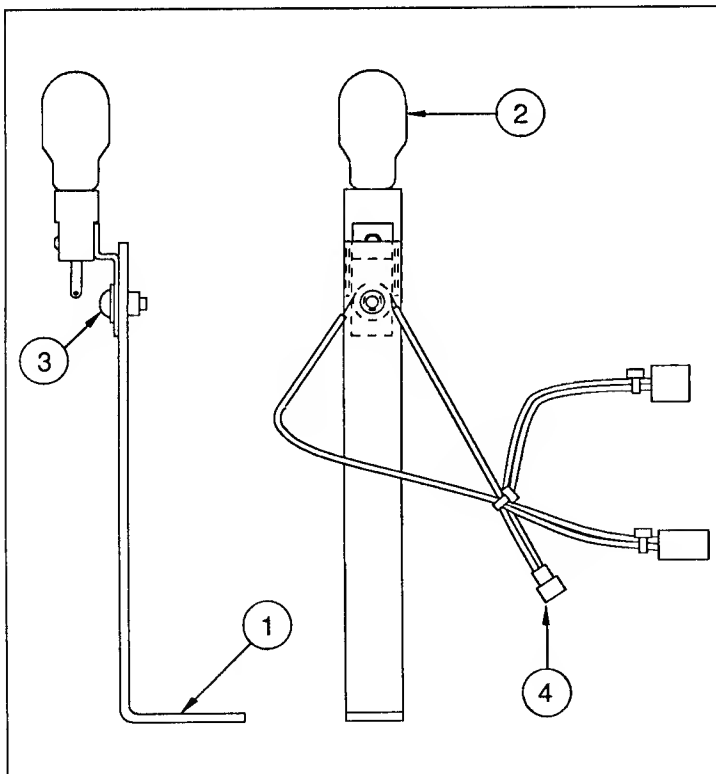


Item	Part Number	Description
1.	A-15354	Ball Return Assembly
2.	01-10640	3-Door Bracket
3.	01-10811	Nut Plate 6-32
4.	4006-01027-05	Mach. Screw, 6-32 x 5/16"
5.	07-6688-17N	Rivet, 1/8 x 5/32 Long
6.	4700-00003-00	Flatwasher, 1/8 x 9/32 x 21ga.
7.	01-10641	Plate Door Release
8.	02-4618	3-Door Shaft
9.	20-8790-1	Nylined Bearing
10.	10-391	Spring
11.	20-8712-18	Truarc "E"-Retaining Ring
12.	03-6047-15	Tubing 1" Long
13.	03-8658	3-Door Target
14.	02-4177	Ball Guide Post
15.	23-6535	Ball Guide Post Bumper
16.	01-10810	3-Door Support Bracket
17.	31-1685-2	Decal
18.	4408-01119-00	Nut 8-32 ESN
19.	4700-00021-00	Flatwasher, 13/64 x 7/16 x 21ga.
20.	03-6047-20	Spacer, 31/32" Long



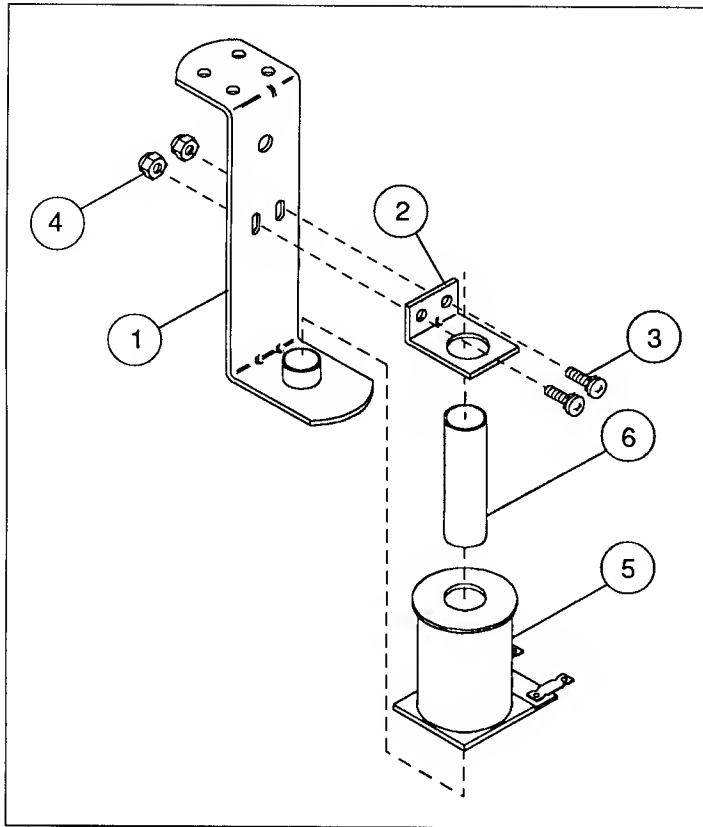
A-16199 Dalek Assembly

Item	Part Number	Description
1.	03-8731	Dalek Bottom
2.	03-8735	Dalek Top



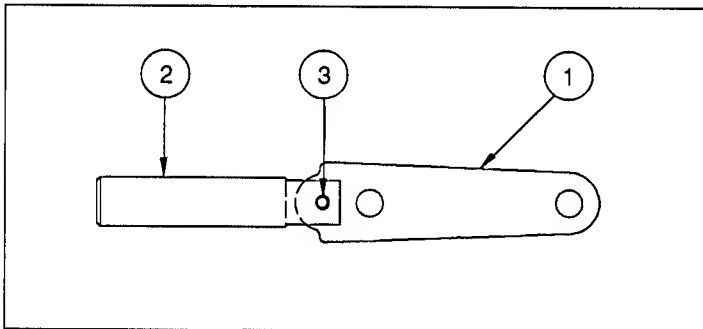
A-16191 Light Dalek Assembly

Item	Part Number	Description
1.	01-10724-1	Bracket
2.	A-12336-1	Light Socket Assy.
3.	4006-01003-04	Mach. Screw, 6-32 x 1/4
4.	H-15703	Cable



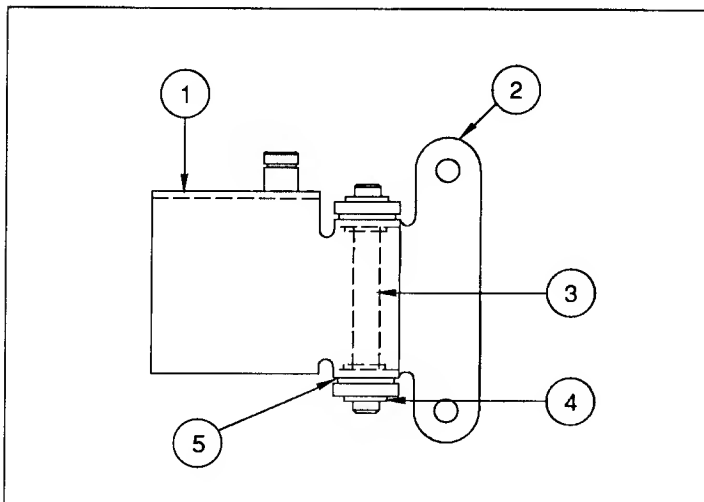
A-15641 Trap Door Assembly

Item	Part Number	Description
1.	B-7572-1	Bracket & Stop Assembly
2.	01-8-508-S	Coil Retaining Bracket
3.	4006-01017-06	Mach. Screw, 6-32 x 3/8
4.	4406-01119-00	Nut, 6-32 ESN
5.	AE-26-1500	Coil Assembly
6.	03-7066	Coil Tubing



A-15442 Cam & Plunger Assembly

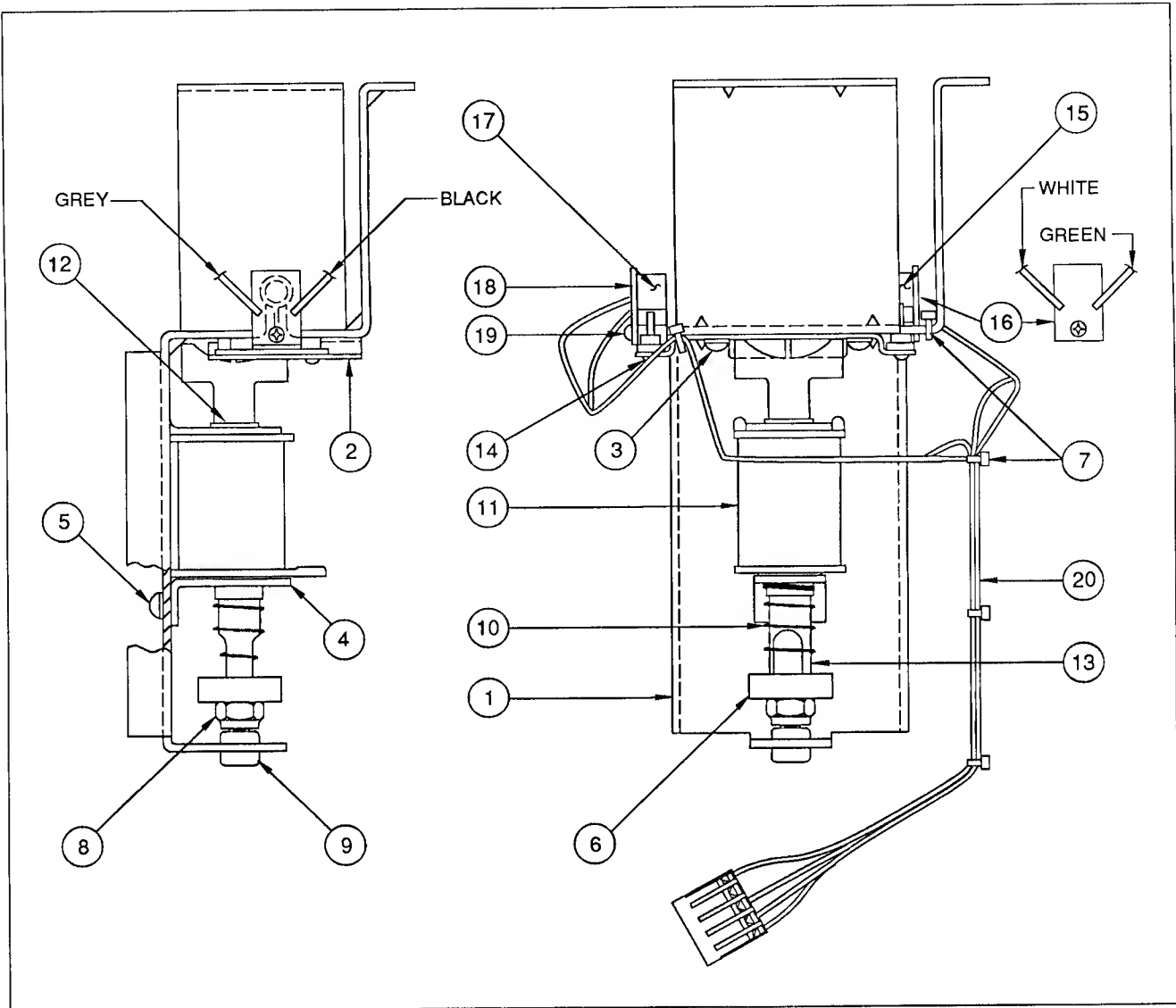
Item	Part Number	Description
1.	A-15443	Cam & Stop Pin Assy.
2.	02-3407	Solenoid Plunger
3.	20-8716-5	Roll Pin 1/8 x 7/16"



A-15444 Gate Assembly

Item	Part Number	Description
1.	A-15445	Gate Sub-Assembly
2.	01-10681	Mounting Bracket
3.	02-4619	Pin Pivot
4.	20-8712-18	"E"-Ring 3/16" Shaft
5.	20-8790-1	Nylin Bearing

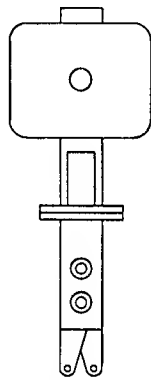
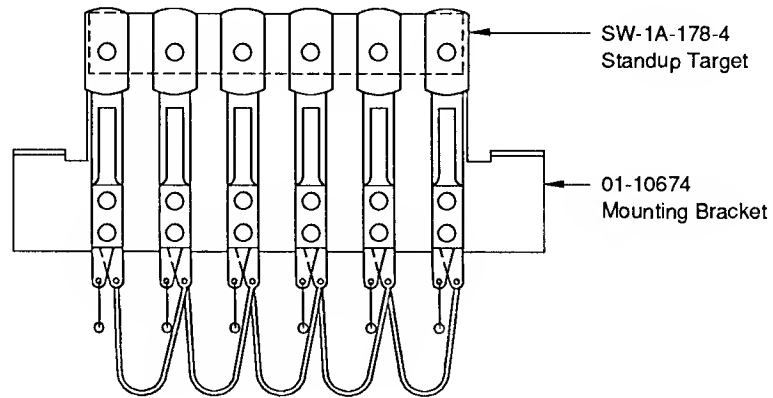
A-15440 Cap Ball Popper Assembly



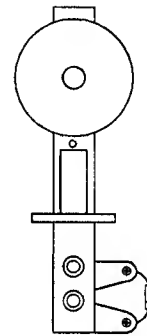
Item	Part Number	Description	Item	Part Number	Description
1.	01-10676	Main Bracket	11.	AE-23-800	Coil Assembly
2.	01-10677	Opto Mounting	12.	03-7067-5	Coil Tubing, Black
3.	4006-01017-04	Mach. Screw, 6-32 P-RH-S	13.	A-15580	Armature Assembly
4.	01-9794	Bracket	14.	4106-01004-06	Sh. Metal Screw, #6 x 3/8 P-PH-ST
5.	4008-01017-04	Mach. Screw, 8-32 x 1/4 P-RH-S	15.	03-8506	Opto Mounting Base, Black
6.	02-2963	Bell Armature Stop	16.	A-14232	Photo Transistor Assembly
7.	03-7520-2	Ty-Wrap	17.	03-8506-1	Opto Mounting Base, White
8.	4420-01119-00	Nut, 1/4-20 ESN	18.	A-14231	LED Assembly
9.	23-6420	Rubber Grommet	19.	4104-01001-06	Sh. Metal Screw, #4 x 3/8 P-PH
10.	10-135	Spring	20.	H-15517	Opto Cable

Target Assemblies

A-15439 6-Target Assembly

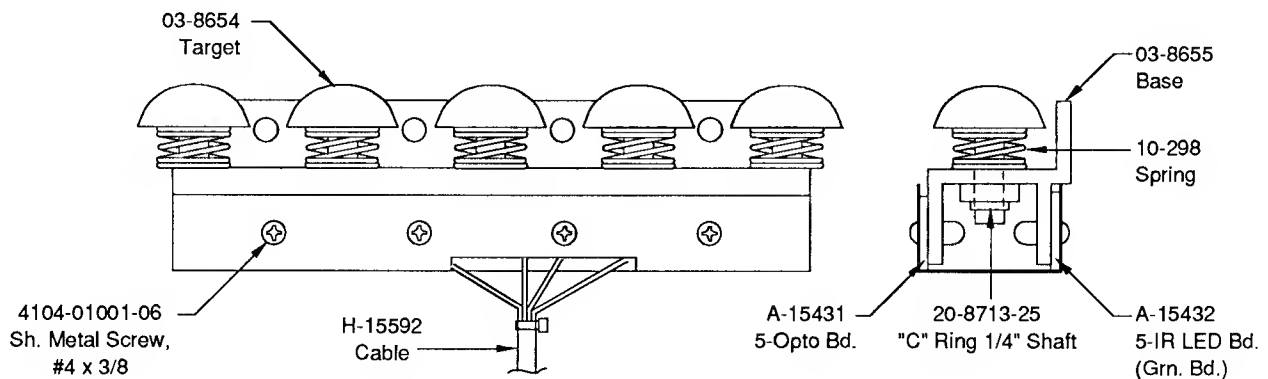


A-15862 Stationary Target w/Decal Assembly (Opaque Red)

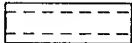
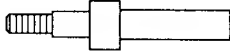
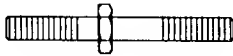
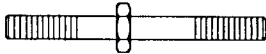
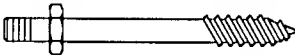

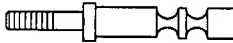
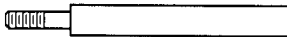
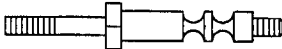

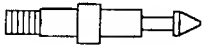
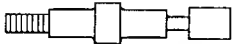
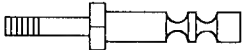

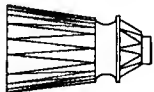


A-15903 Standup Target w/Decal Assembly (Opaque Red)

A-15500 5-Target Assembly



Metal & Plastic Posts

	Part Number	Description	Quantity
	02-4020	Support Post	2
	02-4036	Mini Post	8
	02-4424-1	Spring Post, 6-32 x 8-32	10
	02-4425-1	Post, 8-32/ #8-32	2
	02-4426-1	Post, #6-32 / #8 SMS	10
	02-4426-2	Post, #6-32 / #8 SMS	3
	02-4433	Post, #8 x 1-3/16"	2
	02-4450	Post Double Bumper	3
	02-4657-1	Mounting Post, 6-32 x 3.25"	1
	02-4658	Double Bumper Post	2
	02-4659	Mini Post	10
	02-4660	Mini Post Single Bumper	1
	02-4677	Mini Post	3
	02-4658	Double Bumper Post	2
	02-4679	Bumper Post #10	1
	03-8319-9	Star Post #8	15

Coin Door Assembly

A-14148-1 U.S.A. Door with Decals

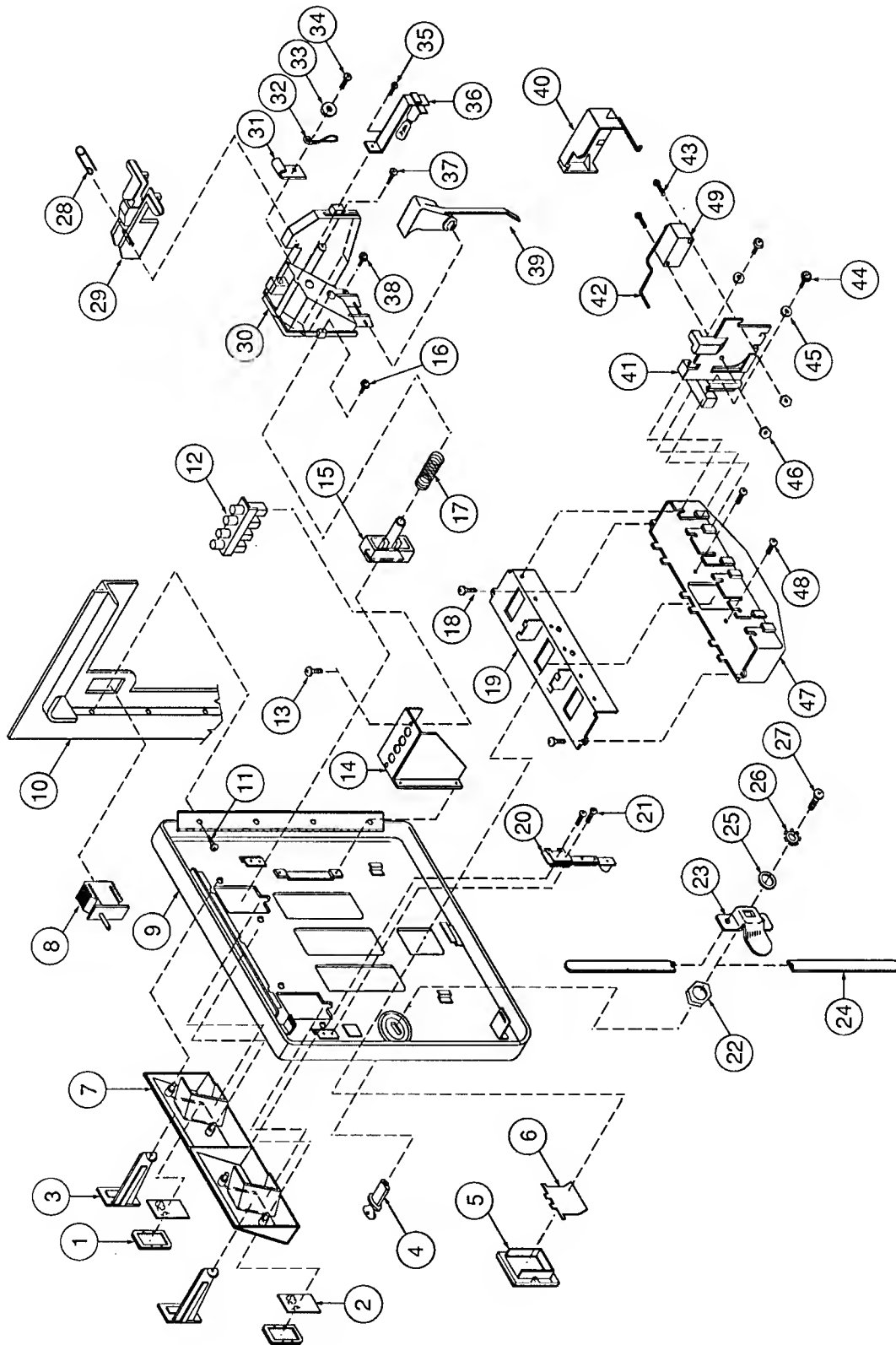
09-17002-x 2-Chute Door

09-17003-x 3-Chute Door

("x" is the country designator)

Item	Part No.	Description	Quantity
1	27-1038	Button Cover	2 or 3
2	27-1041-1→ 58	Price Panel	2 or 3
3	27-1026-1→ 17	Coin Entry Plate	2 or 3
4	27-1016	Lock Assembly	1
5	27-1061-1	Coin Return - Bezel	1
6	27-1062	Coin Return Flap	1
7	27-1021	Button Housing - 2-slot	1
	27-1022	Button Housing - 3-slot	1
8	27-1111	Interlock Switch	1
9	27-1006-1	Coin Door , 2-Slot	1
	27-1007-1	Coin Door , 3-Slot	1
10	27-1005	Coin Door Frame	1
11	27-1003	M/C Screw, 6-32 x 3/16	4
12	5641-12724-00	Diagnostic Switch	1
13	27-1101	M/C Screw, 4-40 x 1/4	2
14	01-9885	Bracket, Diagnostic Switch	1
15	27-1037	Plastic Button	1
16	27-1078	M/C Screw, 6-32 x 3/8	2 or 3
17	27-1039	Conical Spring	2 or 3
18	27-1079	Self-tapping Screw, #6 x 1/4	2
19	27-1077-1	Coinbox Cover	1
20	27-1066	Slam Switch	1
21	27-1067	M/C Screw, 4-40 x 1/2	2
22	27-1017	Nut (key)	1
23	27-1012	Locking Cam	1
24	27-1011	Locking Arm	2
25	27-1020	Washer	1
26	27-1018	Star Washer	1
27	27-1019	M/C Screw, 1/4-28 x 5/16	1
28	27-1089	R-Ring	1
29	27-1083	Retainer	1
30	27-1081	Coin Inlet Chute	2 or 3
31	27-1088	Cable Clamp	2 or 3
32	27-1025	Key Hook	1
33	27-1086	Washer, #6	2 or 3
34	27-1078	M/C Screw, 6-32 x 3/8	1 or 2
	27-1113	M/C Screw, 6-32 x 7/16	1
35	27-1079	Self-tapping Screw, #6 x 1/4	2 or 3
36	27-1084	Lamp Socket	2 or 3
	27-1085	Lamp	2 or 3
37	27-1096	Self-tapping Screw, #5 x 3/8	2 or 3
38	27-1087	M/C Screw, 6-32 x 5/8	2 or 3
39	27-1082	Lever Arm	2 or 3
40	27-1097	Switch Cover	2 or 3
41	27-1091-1	Coin Accept Chute	2 or 3
42	27-1075	Wire Form (Small)	2 or 3
	or		
	27-1093	Wire Form (Large)	
43	27-1094	M/C Screw, 4-40 x 7/8	4 or 6
44	27-1087	M/C Screw, 6-32 x 5/8	4 or 6
45	27-1086	Washer, #6	4 or 6
46	27-1095	Nut, 4-40 ESNA	4 or 6
47	27-1076-1	Coin Return Box	1
48	27-1078	M/C Screw, 6-32 x 3/8	2
49	27-1092	Microswitch	2 or 3

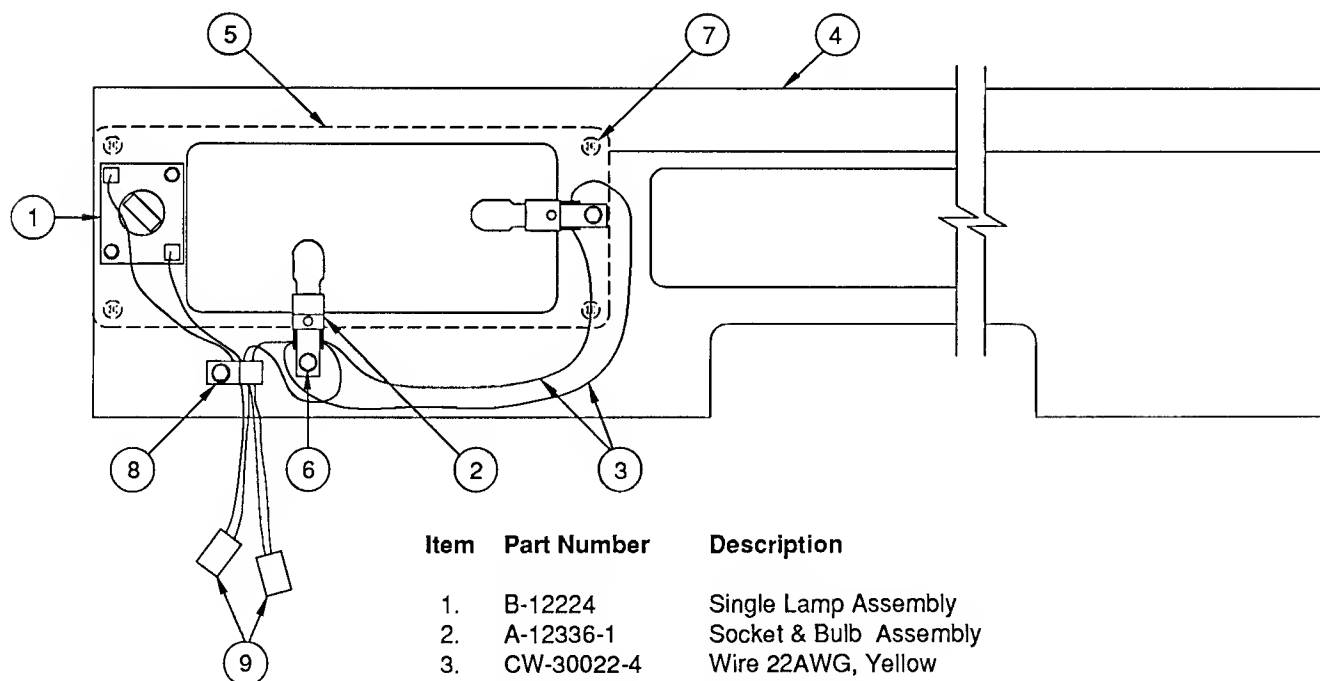
Coin Door Assembly



Cable List

Part Number	Description	Part Number	Description
H-11835	Knocker Cable	H-15517	Opto Cable
H-13870	Black Jumper Cable	H-15518	Playfield Switch Cable
H-14584	Dot Matrix Display Cable	H-15519	Playfield Lamp Cable
H-14790	A.C. Cable	H-15520	Playfield Solenoid Cable
H-14792-1	A.C. Jumper Cable	H-15521	Insert Cable
H-14792-2	A.C. Jumper Cable	H-15586	Cabinet Cable
H-15011	Speaker Panel Cable	H-15587	Speaker Lamp Cable
H-15476	Logic Power Cable	H-15588	Right Ramp Cable
H-15478	Tilt Switch Cable	H-15591	Home Opto Cable
H-15511	3-Switch Cable	H-15592	Five Opto Cable
H-15512	Ramp Lamp Cable	H-15593	Motor Cable
H-15513	Flasher Cable	H-15594	Mini-Playfield Lamp Cable
H-15514	Mini-Playfield Cable	H-15702	Ramp Opto Cable
H-15515	Back Panel Cable	H-15724	Cabinet Button Cable
H-15516	Ramp Switch Cable	H-15736	Secondary Cable

A-15501 Back Panel Assembly



Item	Part Number	Description
1.	B-12224	Single Lamp Assembly
2.	A-12336-1	Socket & Bulb Assembly
3.	CW-30022-4	Wire 22AWG, Yellow
4.	11-831-20006	Back Panel
5.	31-1681-12	Playfield Plastic
6.	4106-01114-08	TCS #6 x 1/2 PLHWH
7.	4106-01033-08	Sh. Metal Screw #6 x 1/2 P-TH-A
8.	03-7655-4	Clip Harness 1/4"
9.	H-15515	Back Panel Cable

Unique Parts List

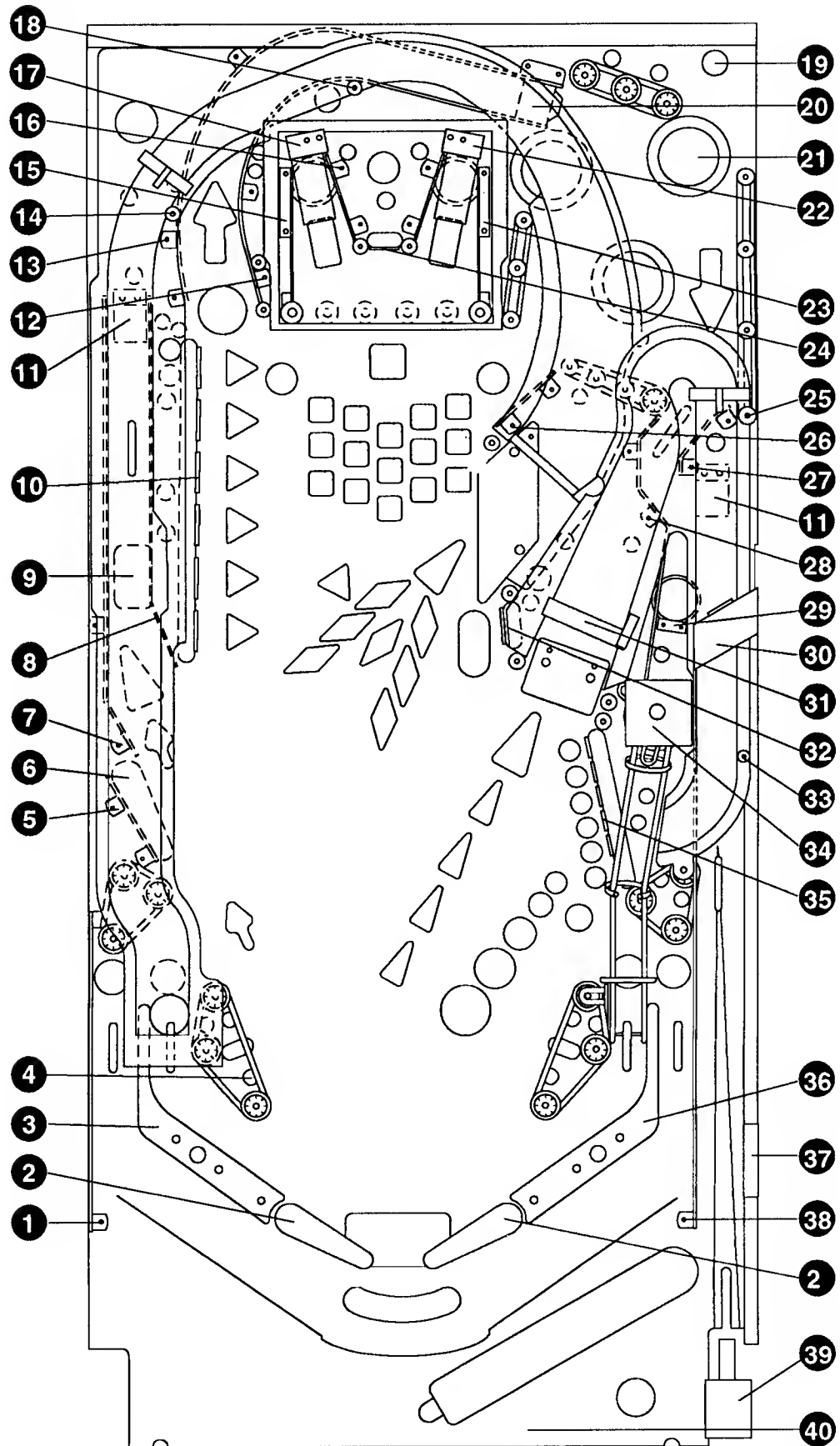
Part Number	Description	Part Number	Description
A-12738-20006	WPC Sound Board	A-15641	Bracket & Coil Assembly
A-12742-20006	WPC CPU Board	A-15647	Tradis Assembly
A-13204-20006	Bottom Arch Assembly	A-15680	Bi-Directional Motor Drive Board
A-13769-20006	Playfield & Insert Assembly	A-15690	Right Ramp Assembly
A-13769-20006	Mini Playfield & Inset Assembly	A-15691	Cover/Sides Mini-Plfd Assy.
A-14376-20006	Backbox Assembly	A-15719	Shooter Gate Assembly
A-15035	Cam Assembly	A-15720	Kicker Bracket Assembly
A-15036	Support Bracket Assembly	A-15742	4-Lamp Board
A-15037	Main Bracket Assembly	A-15748	Cover Assembly
A-15309-1	2-10W Resistor PCB Assembly	A-15805	7-Lamp Board
A-15340	Motor EMI w/Brake Assembly	A-15806	Interrupter Assembly
A-15354	Ball Return , Ramp Assembly	A-15823	Speaker/ Display Assembly
A-15355	Bracket Door Release Assy.	A-15827	Switch Gate Assembly
A-15356	3-Door Assembly	A-15831-4	Stationary Target Assy. - Op. Red
A-15358	Ball Popper Assembly	A-15832-4	Stationary Target Assy. - Op. Red
A-15358-1	Ball Popper Assembly	A-15862	Standup Target & Decal Assy.
A-15424	15-Lamp Board	A-15894	Double Flipper Opto Assembly
A-15426	8-Lamp Board	A-15894-1	Single Flipper Opto Assembly
A-15427	5-Lamp Board	A-15896	Switch Button & Cable Assembly
A-15428	6-Lamp Board	A-15903	Standup Target Assembly
A-15429	5-Lamp Board	A-15904	Switch Gate & Decal Assy.
A-15430	Opto Switch 10-PCB Assy.	A-16191	Dalek Light Assembly
A-15431	5-Opto PCB Assembly	A-16199	Dalek Assembly
A-15432	5 LED PCB Assembly	A-8552-20006	Back Glass Assembly
A-15436	Main Ramp Assembly		
A-15438-L	Flipper Ball Guide Assembly, Left	02-4252-25	F-F Spacer 6-32 x 9/16"
A-15438-R	Flipper Ball Guide Assembly, Right	02-4657-1	Post 6-32 x 3.25 Mtg. Ramp
A-15439	6-Target Assembly, Opaque Red	02-4677	Rubber Bumper Post #10
A-15440	Cap Ball Popper Assembly	02-4678	Double Bumper Post #10
A-15441	Lower Ramp Assembly	02-4679	Bumper Post #10
A-15442	Cam & Plunger Assembly		
A-15443	Cam & Stop Pin Assembly	03-7960-20006	Mylar Playfield Set
A-1544	Gate Assembly		
A-15459-1	Cashbox Assembly	11-1066-20006	Wood Cabinet
A-15477	Switch Bracket Assembly		
A-15500	5-Target Assembly	31-1002-20006	Screened Playfield
A-15501	Back Panel Assembly	31-1002A-20006	Screened Playfield
A-15551	Flap Assembly	31-1008-20006	Screened Bottom Arch
A-15581	Main & Support Bracket Assembly	31-1357-20006	Screened Translite
A-15582	Mini-Playfield Cover Assembly	31-1420-20006	Screened Speaker Panel Cover
A-15604	Ramp Ball Popper Assembly	31-1681	Playfield Plastics Set
A-15631-4	Standup Target w/Decal - Op. Red	31-1685	Standup Target Decal Set
A-15634	Motor & Cam Assembly	31-1686	Decal Set - Top
A-15640-1	Playfield Plastic Assembly	31-1687	Decal Set - Bottom
A-15640-2	Playfield Plastic Assembly	31-1688	Decal Set - Top/Bottom (Small)
		31-1708	Decal Set - Dome

UPPER PLAYFIELD PARTS LIST

Item	Part Number	Description		
1	01-10682	Ball Guide	Not Shown:	
2	20-9734-6	Flipper Bat and Shaft (2)		
3	A-15438-L	Flipper Ball Guide	A-13204-2006	Bottom Arch Assembly
4	B-8284-1	Kicker Count Switch	A-15691	Mini-playfield Cover/Side
5	01-10683	Ball Guide	A-8645	Wire Form & Bracket
6	20-9250-6	Flipper Bat and Shaft	B-8623	Guide & Baffle Assy.
7	01-10688	Ball Guide	C-8235	Ball Runway Assy.
8	01-10689	Ball Guide	01-3569-1	Ball Return Runway
9	A-15444	Gate Assembly	01-5575	Bottom Arch Mtg. Brkt. (2)
10	A-15631-4	Stand-up Target w/Decal	01-8419	Holdown Bracket (2)
11	A-12121	Ball Deflector	01-10136	Shooter Cover Plate
12	01-10690	Ball Guide	03-7960-20006-2	Jet Area Mylar
13	01-10691	Ball Guide	03-7960-20006-3	Drop Area Mylar
14	02-4657-2	Stand-off 3"	03-7960-20006-4	Oval Mylar
15	01-10644-L	Ball Guide	03-7960-20006-5	Mini-playfield Mylar
16	01-10671	Ball Guide (2)	12-6542	Runway Gate Wire
17	01-10646-L	Deflector Bracket	20-6500	1 1/16 Steel Ball (3)
18	02-4657-1	Stand-off 3 1/4"	36-20006	*Screened Playfield
19	02-4252-10	Stand-off 5/8"	36-20006-1	Screened Mini-playfield
20	A-8112-L	Ball Gate Assembly	31-1681-1 thru 18	Playfield Plastics
21	B-9414-3	Jet Bumper Assembly		
	03-8254-9	Jet Bumper Cap, Red		
22	01-10646-R	Deflector Bracket		
23	01-10644-R	Ball Guide		
24	A-15903	Stand-up Target w/Decal		
25	02-4436-2	Stand-off 2.31"		
26	01-10687	Ball Guide		
27	01-10685	Ball Guide		
28	01-10686	Ball Guide		
29	01-10673	Ball Deflect Bracket		
30	A-15719	Shooter Gate Assembly		
31	A-15904	Switch Gate & Decal		
32	A-15862	Stand-up Target w/Decal		
33	02-4436-13	Stand-off 2 1/8"		
	A-12258-2	8-32 Nut Plate Assembly		
34	A-15647	Tardis Assembly		
35	A-15439	6 Target Assembly		
36	A-15438-R	Flipper Ball Guide		
37	A-15802	Level Assembly		
38	01-10684	Ball Guide		
39	A-15720	Kicker Bracket Assembly		
40	A-8039-3	Ball Release Assembly		

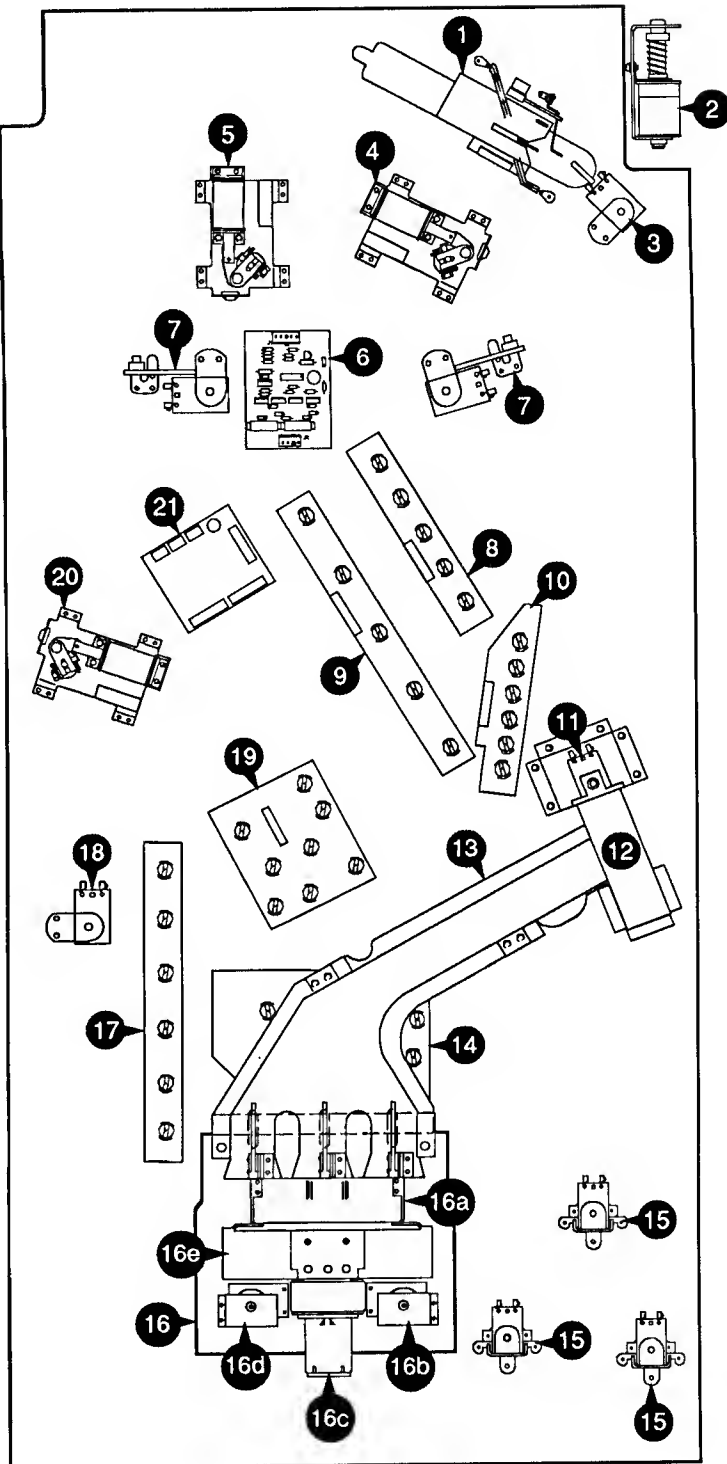
* The DOCTOR WHO Diamond Plate™ playfield does not require a full mylar. However, mylars can be purchased through your local Bally Distributor (ref. #03-7960-20006-1).

UPPER PLAYFIELD PARTS LOCATIONS



LOWER PLAYFIELD PARTS

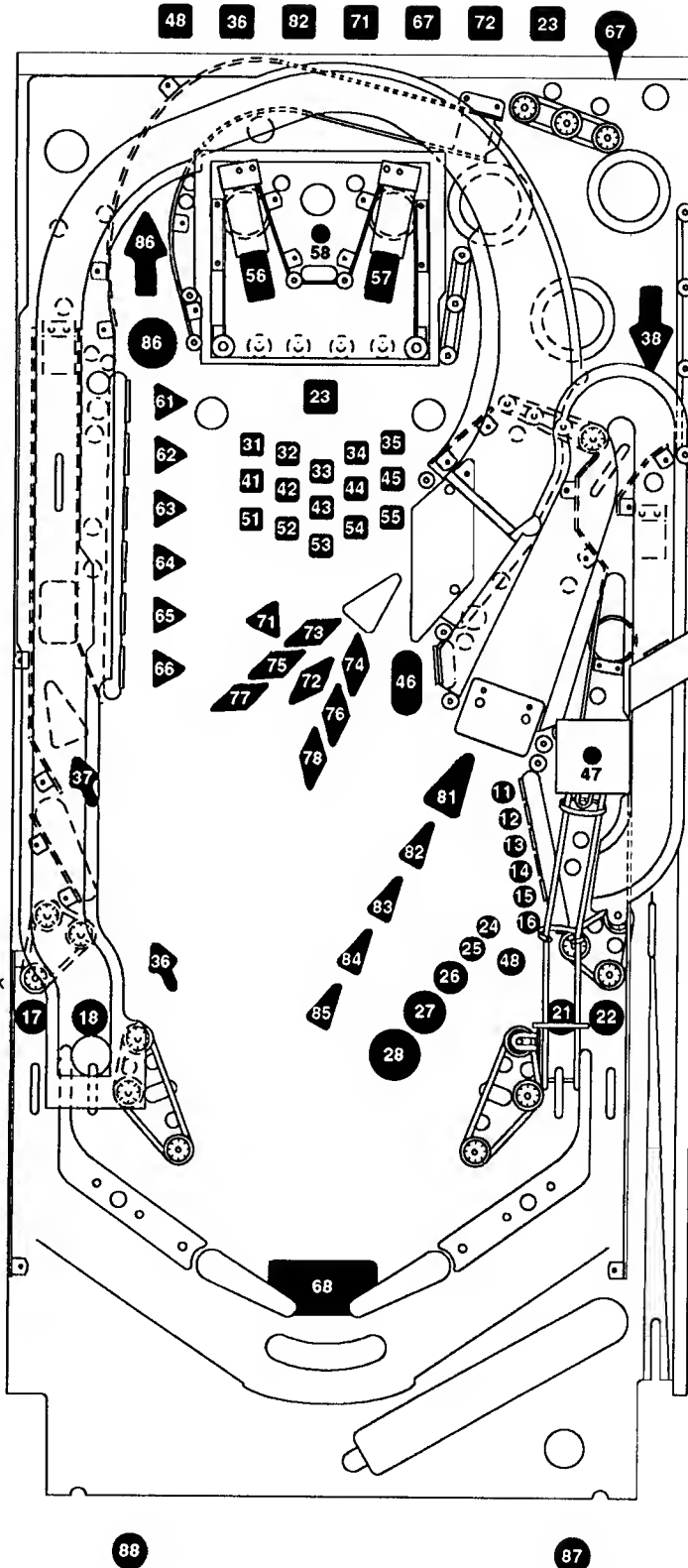
Item	Part Number	Description
1.	B-8925	Micro-Switch Plate Assembly
2.	A-15720	Kicker Assembly
3.	C-9638	Multiball Eject Assembly
	10-128	Spring
	B-9362-L-2	Coil & Bracket Assembly
4.	A-15205-R-4	Lower Right Flipper
5.	A-15205-L-4	Lower Left Flipper
6.	A-15680	Bi-Directional Motor Drive Assy.
7.	B-12665	Kicker Arm (Slingshot) Assy. (2)
	B-11203-R-1	Coil & Bracket Assembly
	10-128	Spring
	B-8284-1	Kicker Switch Assembly
8.	A-15429	5-Lamp Board Assembly
9.	A-15427	5-Lamp Board Assembly
10.	A-15428	6-Lamp Board Assembly
11.	A-15440	Cap Ball Popper Assembly
12.	01-10675	Ball Popper Ramp
13.	A-15441	Lower Ramp Assembly
14.	A-15424	15-Lamp Board Assembly
15.	A-9415-2	Jet Bumper Assembly (3)
	B-12030-2	Switch & Diode Assembly (3)
16.	20006-PL-UP	Mini-Playfield Assembly
a)	A-15356	3-Door Assembly
b)	A-15358	Ball Popper Assembly
c)	A-15634	Motor & Cam Assembly
d)	A-15358-1	Ball Popper Assembly
e)	A-15581	Main Support Bracket Assembly
17.	A-14520	6-Lamp Board Assembly
18.	A-15641	Trap Door Assembly
	10-399	Spring
	A-15442	Cam & Plunger
	A-15477	Switch Bracket Assembly
19.	A-15426	8-Lamp Board Assembly
20.	A-16090-L-4	Upper-Left Flipper
21.	A-15430	10-Switch Opto PC Board



Underside of Playfield, Viewed in Raised Position

LAMP LOCATIONS

Item No.	Bulb No.	Lamp Assy. No.	Description
11	24-8768	A-15428	(E)-S-C-A-P-E
12	24-8768	A-15428	E-(S)-C-A-P-E
13	24-8768	A-15428	E-S-(C)-A-P-E
14	24-8768	A-15428	E-S-C-(A)-P-E
15	24-8768	A-15428	E-S-C-A-(P)-E
16	24-8768	A-15428	E-S-C-A-P-(E)
17	24-6549	A-11271	Left Drain
18	24-6549	A-11271	Left Return
21	24-6549	A-11271	Right Return
22	24-6549	A-11271	Right Drain
23	24-8768	A-15805	Doctor 7 (1 playfield)
	24-6549	A-8882	(1 speaker panel)
24	24-8768	A-15427	ESCAPE Special
25	24-8768	A-15427	ESCAPE 3,000,000
26	24-8768	A-15427	ESCAPE 2,000,000
27	24-8768	A-15427	ESCAPE 1,000,000
28	24-8768	A-15427	ESCAPE 500,000
31	24-8768	A-15424	5X3, Top Left 1
32	24-8768	A-15424	5X3, Top Left 2
33	24-8768	A-15424	5X3, Top Middle
34	24-8768	A-15424	5X3, Top Right 2
35	24-8768	A-15424	5X3, Top Right 1
36	24-8768	A-15805	Doctor 2 (1 playfield)
	24-8768	A-11271	(1 speaker panel)
37	24-6549	A-11754	Hang On Score
38	24-6549	A-11754	Video Mode
41	24-8768	A-15424	5X3, Middle Left 1
42	24-8768	A-15424	5X3, Middle Left 2
43	24-8768	A-15424	5X3, Middle Middle
44	24-8768	A-15424	5X3, Middle Right 2
45	24-8768	A-15424	5X3, Middle Right 1
46	24-6549	A-11754	Transmat Award
47	24-8768	A-15647	Tardis
48	24-8768	A-15805	Doctor 1 (1 playfield)
	24-8768	A-11271	(1 speaker panel)
51	24-8768	A-15424	5X3, Bottom Left 1
52	24-8768	A-15424	5X3, Bottom Left 2
53	24-8768	A-15424	5X3, Bottom Middle
54	24-8768	A-15424	5X3, Bottom Right 2
55	24-8768	A-15424	5X3, Bottom Right 1
56	24-6549	A-8882	Mini-playfield Left Lock
57	24-6549	A-8882	Mini-playfield Right Lock
58	24-6549	A-11905	Mini-playfield Target
61	24-8768	A-14520	(R)-E-P-A-I-R
62	24-8768	A-14520	R-(E)-P-A-I-R
63	24-8768	A-14520	R-E-(P)-A-I-R
64	24-8768	A-14520	R-E-P-(A)-I-R
65	24-8768	A-14520	R-E-P-A-(I)-R
66	24-8768	A-14520	R-E-P-A-I-(R)
67	24-8768	A-15805	Doctor 5 (1 playfield)
	24-8767	B-12224	(1 back panel)
68	24-6549	A-11754	Shoot Again
71	24-8768	A-15805	Doctor 4 (1 playfield)
	24-8768	A-15426	(1 speaker panel)
72	24-8768	A-15805	Doctor 6 (1 playfield)
	24-8768	A-15426	(1 speaker panel)
73	24-8768	A-15426	1.5X
74	24-8768	A-15426	2X
75	24-8768	A-15426	2.5X
76	24-8768	A-15426	3X
77	24-8768	A-15426	3.5X
78	24-8768	A-15426	4X
81	24-8768	A-15427	W-H-O (W)
82	24-8768	A-15805	Doctor 3 (1 playfield)
	24-8768	A-15427	(1 speaker panel)
83	24-8768	A-15427	W-H-O 1,000,000
84	24-8768	A-15427	W-H-O 2,000,000
85	24-8768	A-15427	W-H-O Lite Extra Ball
86	24-6549	A-11754	Ball Transmat &
	24-8768	A-11271	Advance Bonus X
87	20-9663-B-2	A-15896	Launch Ball
88	---	20-9663-1	Game Start

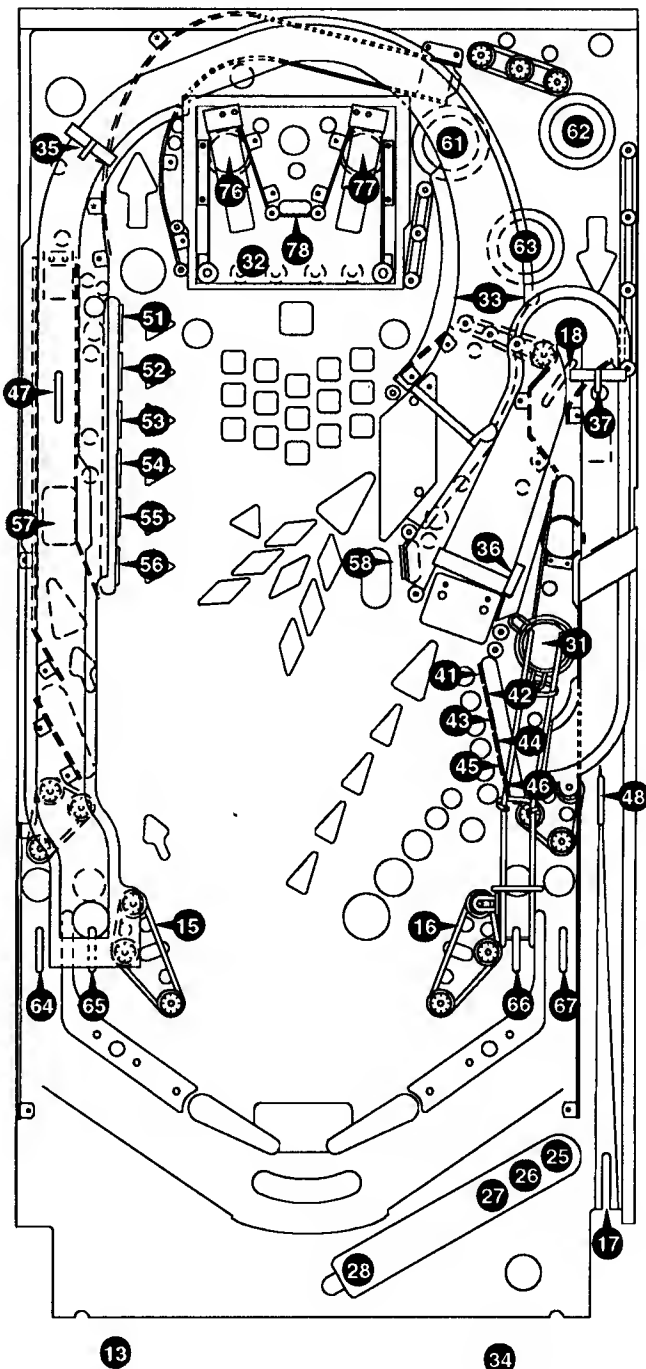
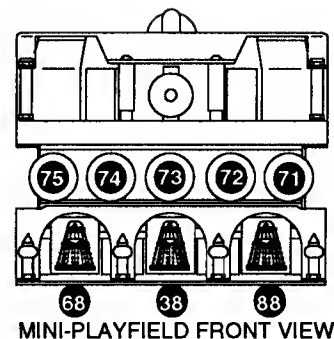


SWITCH LOCATIONS

Item	Switch Number	Assembly Number	Description
F1	SW-1A-193	A-15205-R-4	*Right Flipper EOS
F2	---	A-15894	*Right Flipper Opto Board
F3	SW-1A-193	A-15205-L-4	*Left Flipper EOS
F4	---	A-15894	*Left Flipper Opto Board
F7	SW-1A-193	A-16090-L-4	*Upper Left Flipper EOS
F8	---	A-15894	*Upper Left Flipper Opto Board
11-12	---	---	Not Used
13	---	20-9663-1	Start Button
14	---	20-6502-A	*Plumb Bob Tilt
15	SW-1A-114	B-8284-1	Left Sling
16	SW-1A-114	B-8284-1	Right Sling
17	5647-12693-04	A-11619	Shooter Lane
18	5647-12693-21	A-12688-1	Exit Jets
21	---	27-1066	*Slam Tilt
22	---	A-8630	*Coin Door closed
23	---	Not Used	*Ticket Opto
24	---	A-8630	*Always Closed
25	5647-12693-08	A-11680	Trough 1 Ball
26	5647-09957-00	B-8925	Trough 2 Balls
27	5647-09957-00	B-8925	Trough 3 Balls
28	5647-12133-12	A-10417	Outhole
31	A-14231 (LED)	A-15440	Opto Popper
	A-14232 (Trans)		
32	A-14231 (LED)	A-15634	†Mini-ply Home Opto
	A-14232 (Trans)		
33	A-14231 (LED)	A-15436	Enter Top Ramp Opto
	A-14232 (Trans)		
34	---	A-15896	Launch Ball
35	5647-12693-21	A-15436	Score Top Ramp
36	5647-12693-11	A-15904	Enter Bottom Ramp
37	5647-12693-21	A-15690	Score Bottom Ramp
38	5647-12693-13	A-12238	Mini-ply Door, Middle
41	---	A-15631-4	(E)-S-C-A-P-E
42	---	A-15631-4	E-(S)-C-A-P-E
43	---	A-15631-4	E-S-(C)-A-P-E
44	---	A-15631-4	E-S-C-(A)-P-E
45	---	A-15631-4	E-S-C-A-(P)-E
46	---	A-15631-4	E-S-C-A-P-(E)
47	5647-12693-19	A-12688	Hang On Score
48	5647-12693-19	A-12688-1	Select Doctor
51	SW-1A-178-4	A-15439	(R)-E-P-A-I-R
52	SW-1A-178-4	A-15439	R-(E)-P-A-I-R
53	SW-1A-178-4	A-15439	R-E-(P)-A-I-R
54	SW-1A-178-4	A-15439	R-E-P-(A)-I-R
55	SW-1A-178-4	A-15439	R-E-P-A-(I)-R
56	SW-1A-178-4	A-15439	R-E-P-A-I-(R)
57	5647-12693-36	A-15477	†Trap Door Down
58	---	A-15862	Transmat Award
61	SW-11A-37	B-12030-2	Left Jet
62	SW-11A-37	B-12030-2	Right Jet
63	SW-11A-37	B-12030-2	Bottom Jet
64	5647-12693-19	A-26888	Left Drain
65	5647-12693-19	A-26888	Left Return
66	5647-12693-19	A-26888	Right Return
67	5647-12693-19	A-26888	Right Drain
68	5647-12693-13	A-12238	Mini-ply Door, Left
71			Mini-ply Opto 5-Bank Right 1
72		A-15431 (Trans)	Mini-ply Opto 5-Bank Right 2
73		& A-15432 (LED)	Mini-ply Opto 5-Bank Middle
74			Mini-ply Opto 5-Bank Left 2
75			Mini-ply Opto 5-Bank Left 1
76		A-14231 (LED)	Mini-ply Left Opto Eject
		& A-14232 (Trans)	
77		A-14231 (LED)	Mini-ply Right Opto Eject
		& A-14232 (Trans)	
78		A-15903	Mini-ply Target
81		---	Not Used
82	5647-12693-11	A-15877	*Playfield Glass
83-87		---	Not Used
88	5647-12693-13	A-12238	Mini-ply Door, Right

* Not shown.

† Located on underside of playfield.



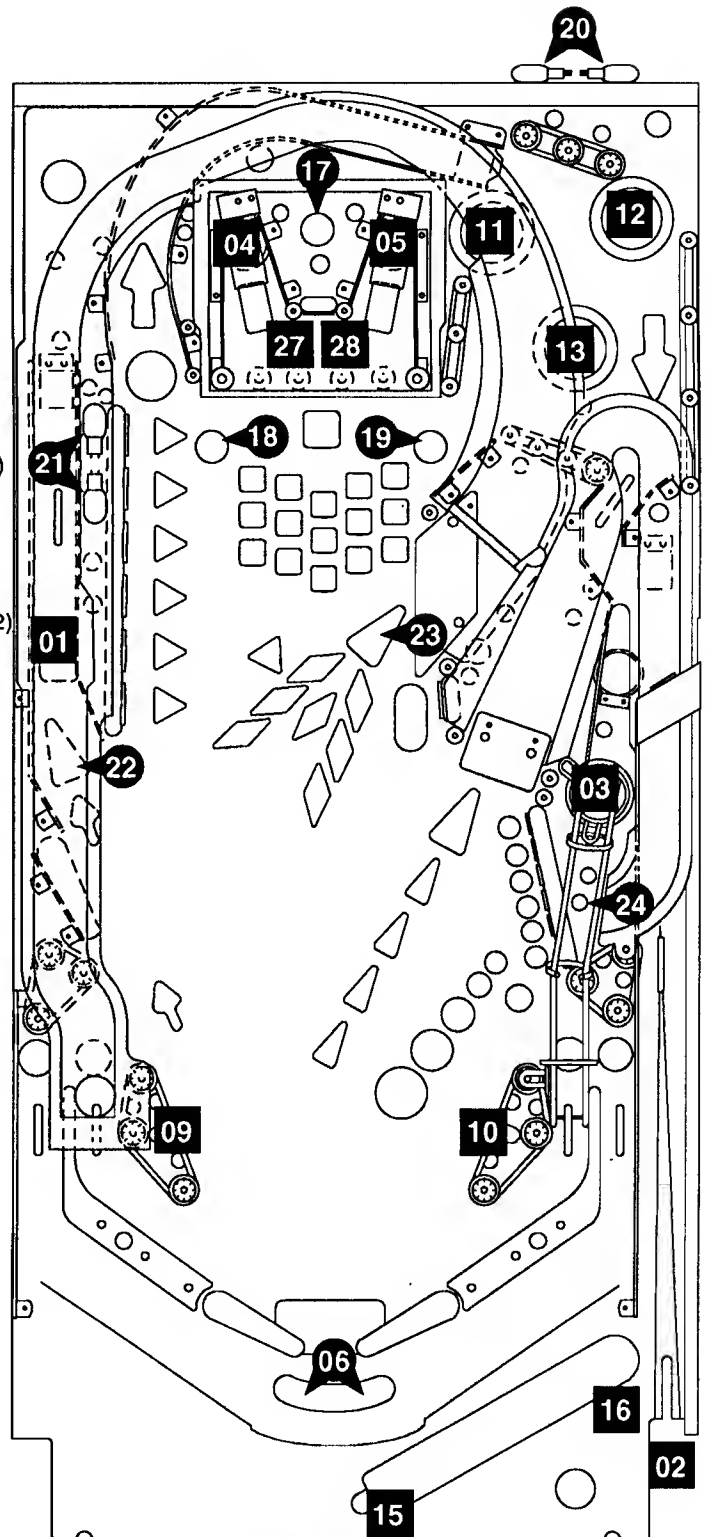
SOLENOID/FLASHER LOCATIONS

Item	Coil/Flasher Number	Assy. No.	Description
01	AE-26-1500	A-15641	Trap Door
02	AE-26-1200	A-15720	Shooter
03	AE-23-800	A-15440	Opto Popper
04	AE-26-1500	A-15358-1	Mini-playfield Left Opto Eject
05	AE-26-1500	A-15358	Mini-playfield Right Opto Eject
06	24-8802	A-12336-1	2nd Change Logo, Flasher (4)
07	AE-23-800	B-10686-1	*Knocker
08	24-8802	---	*Doctor 3, Flasher .
09	AE-26-1500	B-11203-R-1	Left Sling
10	AE-26-1500	B-11203-R-1	Right Sling
11	AE-26-1200	A-9415-2	Left Jet
12	AE-26-1200	A-9415-2	Right Jet
13	AE-26-1200	A-9415-2	Bottom Jet
14	24-8802	A-12336-1	*Backbox Head, Flasher (if used)
15	AE-27-1200	B-8039-3	Outhole
16	AE-26-1200	B-9362-L-2	Trough
17	---	A-16041	Mini-playfield/Doctor 7, Flasher
18	24-8802	A-12336-1	5x3 Left/Left, Flasher
19	24-8802	A-12336-1	5x3 Right/Right, Flasher
20	24-8802	A-12336-1	Jet Bumpers/Doctor 5, Flasher (2)
21	24-8802	A-12336-1	REPAIR/Doctor 4, Flasher (2)
22	24-8802	A-12336-1	W-(H)-O/Doctor 2, Flasher
23	24-8802	A-12336-1	W-H(O)/Doctor 6, Flasher
24	24-8704	A-8798	ESCAPE/Doctor 1, Flasher
25	---	---	Not Used
26	---	---	Not Used
27	---	A-15680	Mini-playfield C.C.W./C.W.
28	---	A-15680	Mini-playfield On/Off

General Illumination Circuits

*01	24-8768	Insert
*02	24-8768	Insert
*03	24-6549/24-8768	Playfield/Insert A
*04	24-6549/24-8768	Playfield/Insert B
*05	24-6549/24-8768	Playfield/Insert C

* FL-15411 (Org)	A-16090-L-4	Upper Left Flipper
* FL-15411 (Org)	A-15205-L-4	Lower Left Flipper
* FL-15411 (Org)	A-15205-R-4	Lower Right Flipper

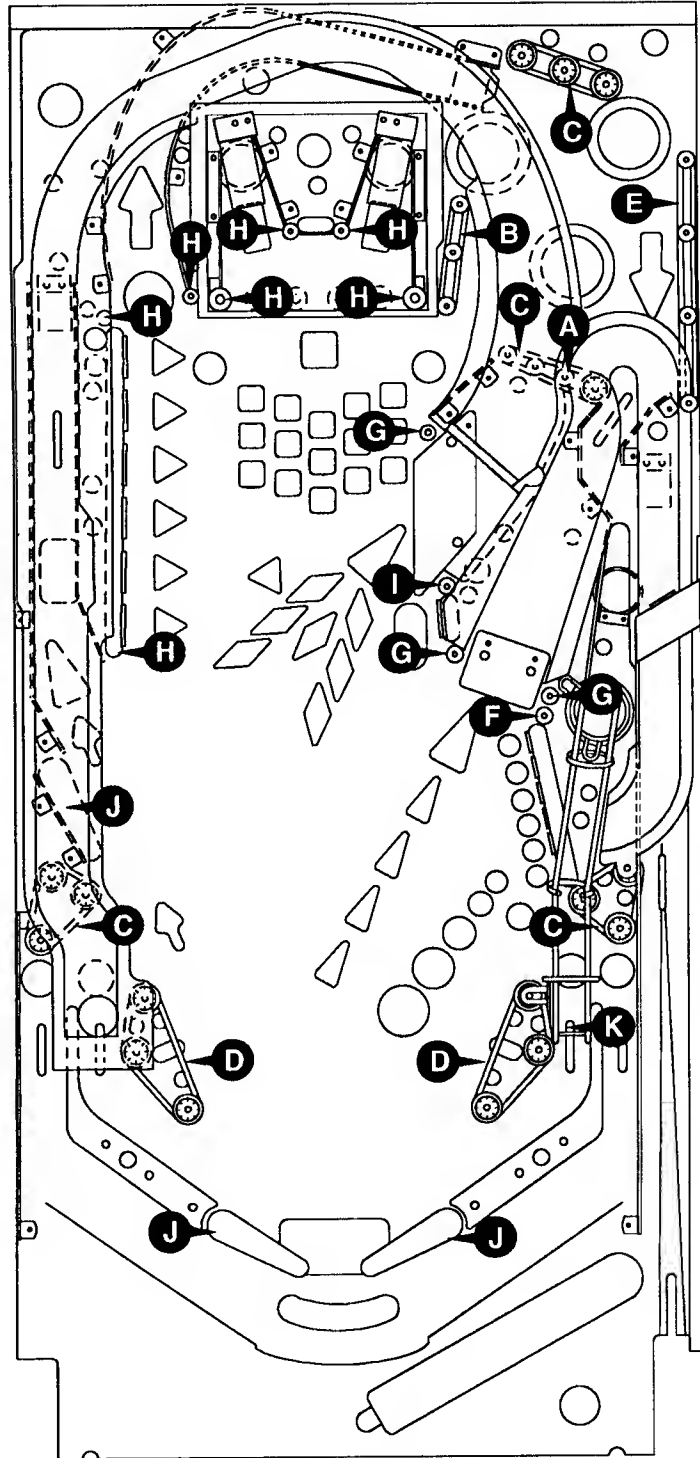


■ Square Indicates coil or P.C.B.
 ● Circle Indicates flasher

* Not shown.

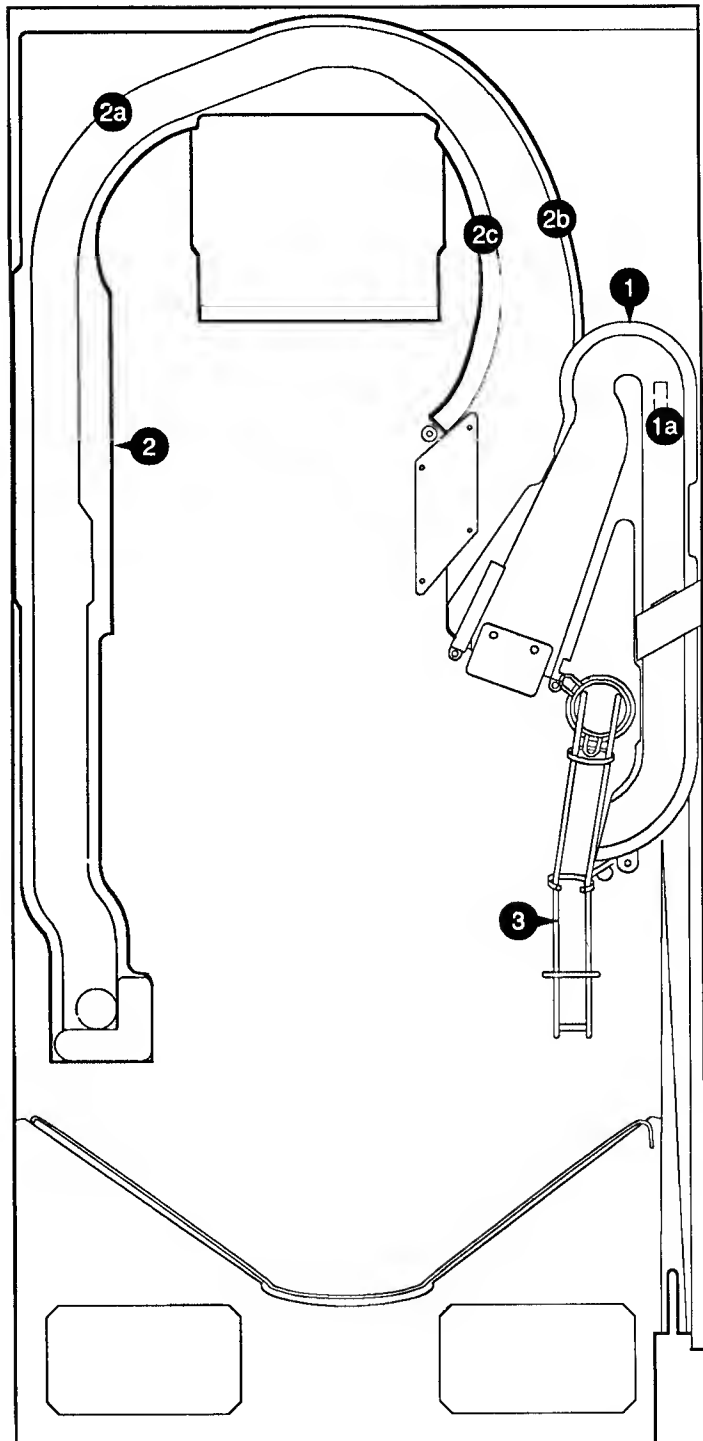
RUBBER PARTS

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
A.	23-6302	1	1" Rubber Ring
B.	23-6303	2	1 1/4" Rubber Ring
C.	23-6304	4	1 1/2" Rubber Ring
D.	23-6305	2	2" Rubber Ring
E.	23-6308	1	3 1/2" Rubber Ring
F.	23-6535	2	Rubber Bumper
G.	23-6552	3	Rubber Sleeve, Yellow
H.	23-6556	7	Rubber Sleeve, Black
I.	23-6579	1	3/4" Tapered Bumper
J.	23-6678-7	3	Flipper Rubber, Black
K.	23-6686	1	Bumper Plug



Ramps

Item	Part Number	Description
1.	A-15690	Right Ramp Assembly
a)	5647-12693-21	Sub-Miniature Switch Assy.
2.	A-15436	Upper Main Assembly
a)	5647-12693-21	Sub-Miniature Switch Assy.
b)	A-14231	Opto LED Assembly
c)	A-14232	Photo Transistor Assy.
3.	A-15604	Ball Popper Ramp Assy.



Game Wiring and Schematics

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and position on that board that it connects to. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, J101 designates jack 1 of board 1 (a Power Driver Board jack); P206 designates plug 6 of board 2 (a CPU Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, J101-3 refers to pin 3 of jack 1 on board 1.

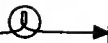
Other game components may also have similar numbers to clarify their locations or related circuits. For example, F501 refers to a fuse located on the Sound Board.

Prefix numbers for the WPC circuit boards are listed below.

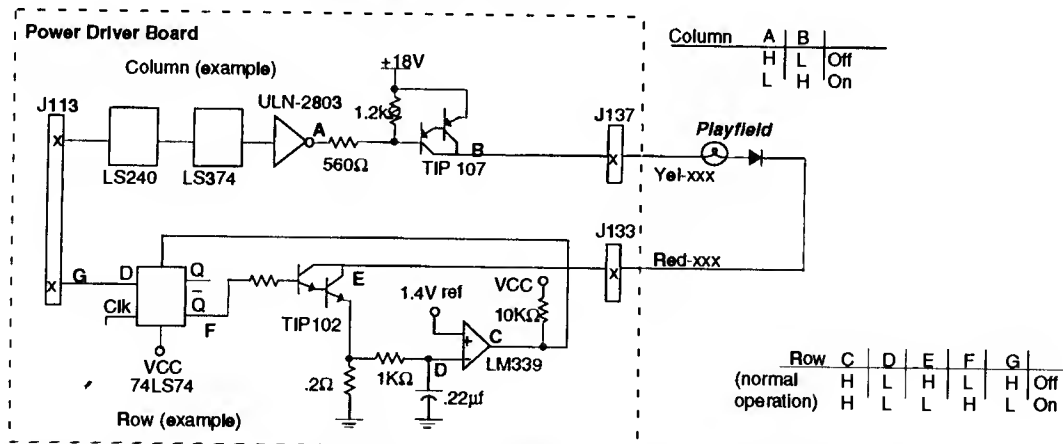
- 1- Power Driver Board
- 2- CPU Board
- 5- Sound Board
- 6- Dot Matrix Controller
Dot Matrix Display/Driver Board
- 9 -Fliptronic II Controller Board

Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet, and all other backbox board schematics are found in this section.

LAMPS

		Yellow (B+)  Red						
Column	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J138-9 Q91
Row								
1	Red-Brown J133-1 Q90 11	(E)-S-C-A-P-E 21 Right Return	5 x 3, Top Left 1 31	5 x 3, Middle Left 1 41	5 x 3, Bottom Left 1 51	(R)-E-P-A-I-R 61	Doctor 4 (2 lamps) 71	(W)-H-O 81
2	Red-Black J133-2 Q89 12	E-(S)-C-A-P-E 22 Right Drain	5 x 3, Top Left 2 32	5 x 3, Middle Left 2 42	5 x 3, Bottom Left 2 52	R-(E)-P-A-I-R 62	Doctor 6 (2 lamps) 72	Doctor 3 (2 lamps) 82
3	Red-Orange J133-4 Q88 13	E-S-(C)-A-P-E 23 Doctor 7 (2 lamps)	5 x 3, Top Middle 33	5 x 3, Middle Middle 43	5 x 3, Bottom Middle 53	R-E-(P)-A-I-R 63	1.5X 73	W-H-O 1,000,000 83
4	Red-Yellow J133-5 Q87 14	E-S-C-(A)-P-E 24 ESCAPE Special	5 x 3, Top Right 2 34	5 x 3, Middle Right 2 44	5 x 3, Bottom Right 2 54	R-E-P-(A)-I-R 64	2X 74	W-H-O 2,000,000 84
5	Red-Green J133-6 Q86 15	E-S-C-A-(P)-E 25 ESCAPE 3,000,000	5 x 3, Top Right 1 35	5 x 3, Middle Right 1 45	5 x 3, Bottom Right 1 55	R-E-P-A-(I)-R 65	2.5X 75	W-H-O Lite Extra Ball 85
6	Red-Blue J133-7 Q85 16	E-S-C-A-P-(E) 26 ESCAPE 2,000,000	Doctor 2 (2 lamps) 36	Transmat Award 46	Mini-ply Left Lock 56	R-E-P-A-I-(R) 66	3X 76	Ball Transmat & Advance Bonus X 86
7	Red-Violet J133-8 Q84 17	Left Drain 27 ESCAPE 1,000,000	Hargon Score 37	Tardis 47	Mini-ply Right Lock 57	Doctor 5 (2 lamps) 67	3.5X 77	Launch Ball 87
8	Red-Gray J133-9 Q83 18	Left Return 28 ESCAPE 500,000	Video Mode 38	Doctor 1 (2 lamps) 48	Mini-ply Target 58	Shoot Again 68	4X 78	Game Start 88

LAMP MATRIX CIRCUIT



The processor sends a signal to the column circuit, causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of TIP102 causes the transistor to conduct, bringing the row circuit to ground and turning the lamp On.

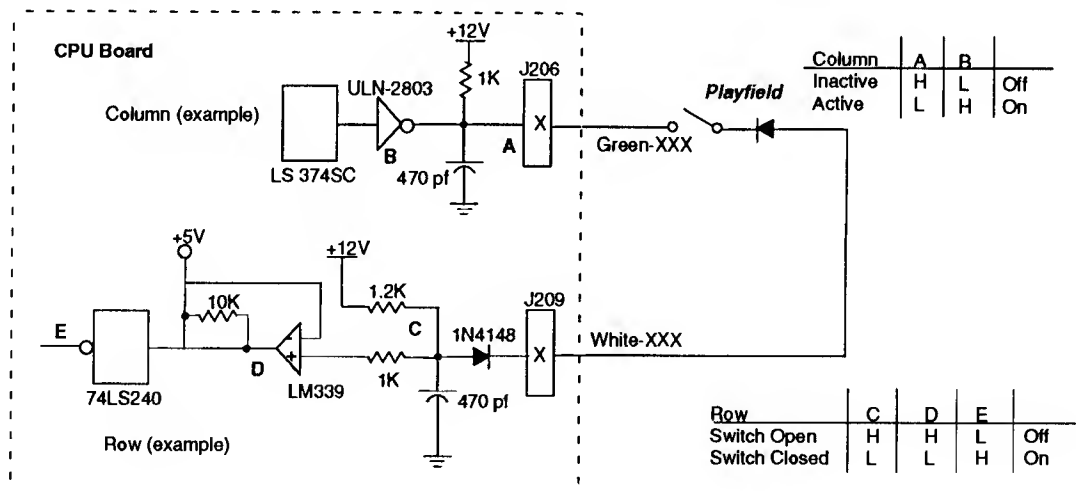
The processor changes the input of the 74LS74 to a high state to turn the lamp Off.

In overcurrent conditions the lamp is shut Off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

SWITCHES

Dedicated Grounded Switches	Column Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J206-1 (1) Left Coin Chute D1	1 White-Brown J208-1 U18-11	Not Used 11	Slam Tilt 21	Opto Popper 31	(E)-S-C-A-P-E 41	(R)-E-P-A-I-R 51	Left Jet 61	Mini Opto 5 Bank Right 1 71	Not Used 81	Black-Green J906-1 Right Flipper End of Stroke F1
Orange-Red J206-2 (2) Center Coin Chute D2	2 White-Red J208-2 U18-9	Not Used 12	Coin Door Closed 22	Mini-ply Home Opto 32	(E)-S-C-A-P-E 42	(R)-E-P-A-I-R 52	Right Jet 62	Mini Opto 5 Bank Right 2 72	Playfield Glass 82	Blue-Violet J905-1 Right Flipper Opto F2
Orange-Black J206-3 (3) Right Coin Chute D3	3 White-Orange J208-3 U18-5	Start Button 13	Ticket Opto. 23	Enter Top Ramp Opto 33	(E)-S-C-A-P-E 43	(R)-E-P-A-I-R 53	Bottom Jet 63	Mini Opto 5 Bank Middle 73	Not Used 83	Black-Blue J906-3 Left Flipper End of Stroke F3
Orange-Yellow J206-4 (4) 4th Coin Chute D4	4 White-Yellow J208-4 U18-7	Plumb Bob Tilt 14	Always Closed 24	Launch Ball 34	(E)-S-C-A-P-E 44	(R)-E-P-A-I-R 54	Left Drain 64	Mini Opto 5 Bank Left 2 74	Not Used 84	Blue-Gray J905-2 Left Flipper Opto F4
Orange-Green J206-5 (5) Normal Function Test Function Service Credits Escape D5	5 White-Green J208-5 U19-11	Left Sling 15	Trough 1 Ball 25	Score Top Ramp 35	(E)-S-C-A-P-E 45	(R)-E-P-A-I-R 55	Left Return 65	Mini Opto 5 Bank Left 1 75	Not Used 85	Black-Violet J906-4 Upper Right Flipper End of Stroke F5
Orange-Blue J206-6 (6) Normal Function Test Function Volume Down Down D6	6 White-Blue J208-7 U19-9	Right Sling 16	Trough 2 Balls 26	Enter Bottom Ramp 36	(E)-S-C-A-P-E 46	(R)-E-P-A-I-R 56	Right Return 66	Mini-ply Left Opto Eject 76	Not Used 86	Black-Yellow J905-3 Upper Right Flipper Opto F6
Orange-Violet J206-7 (7) Normal Function Test Function Volume Up Up D7	7 White-Violet J208-8 U19-5	Shooter Lane 17	Trough 3 Balls 27	Score Bottom Ramp 37	Hang On Score 47	Trap Door Down 57	Right Drain 67	Mini-ply Right Opto Eject 77	Not Used 87	Black-Gray J906-5 Upper Left Flipper End of Stroke F7
Orange-Gray J206-8 (8) Normal Function Test Function Begin Test Enter D8	8 White-Gray J208-9 U19-7	Exit Jets 18	Outhole 28	Mini-ply Door, Middle 38	Select Doctor 48	Transmat Award 58	Mini-ply Door, Left 68	Mini-ply Lites Lock 78	Mini-ply Door, Right 88	Black-Blue J905-5 Upper Left Flipper Opto F8

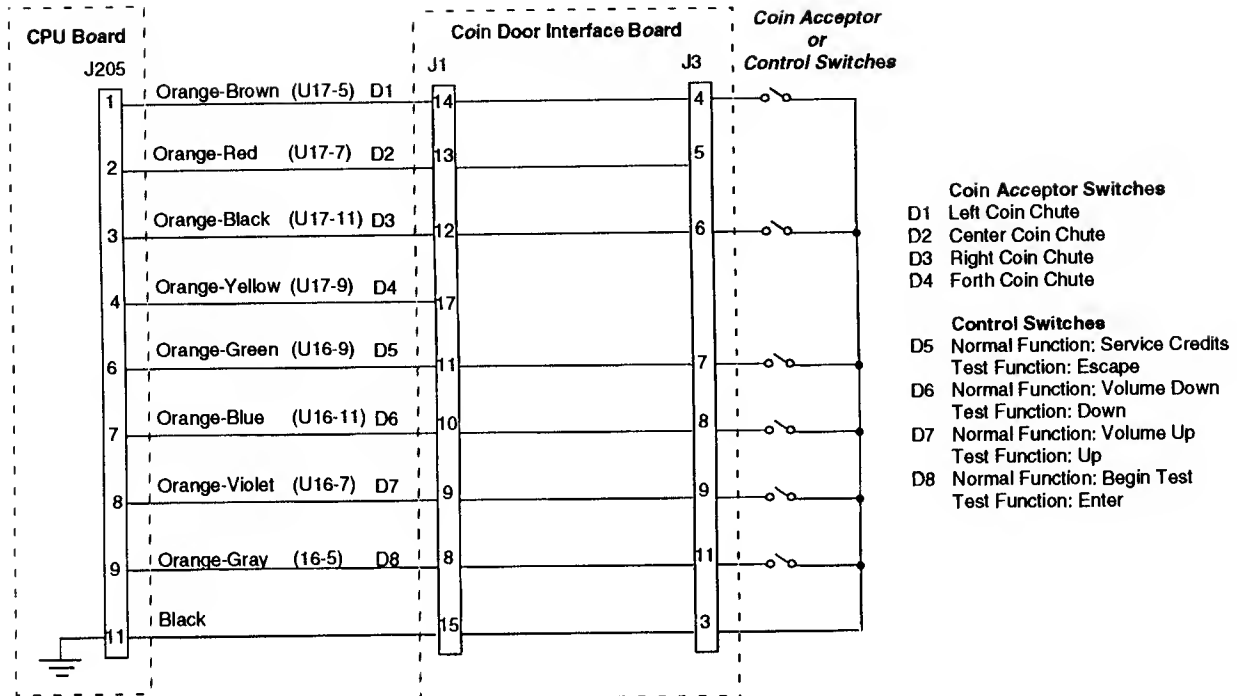
SWITCH MATRIX CIRCUIT



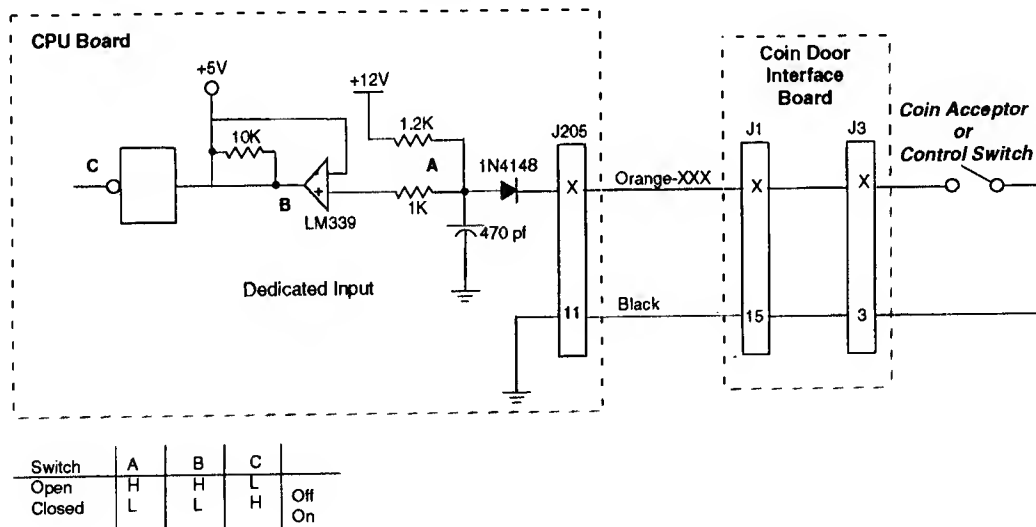
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low the column side is active.

When a switch closes, the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Corresponding row and column switches must be low at the same time, for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

DEDICATED SWITCHES



DEDICATED SWITCH CIRCUIT



The dedicated switches operate similar to switches in the matrix except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

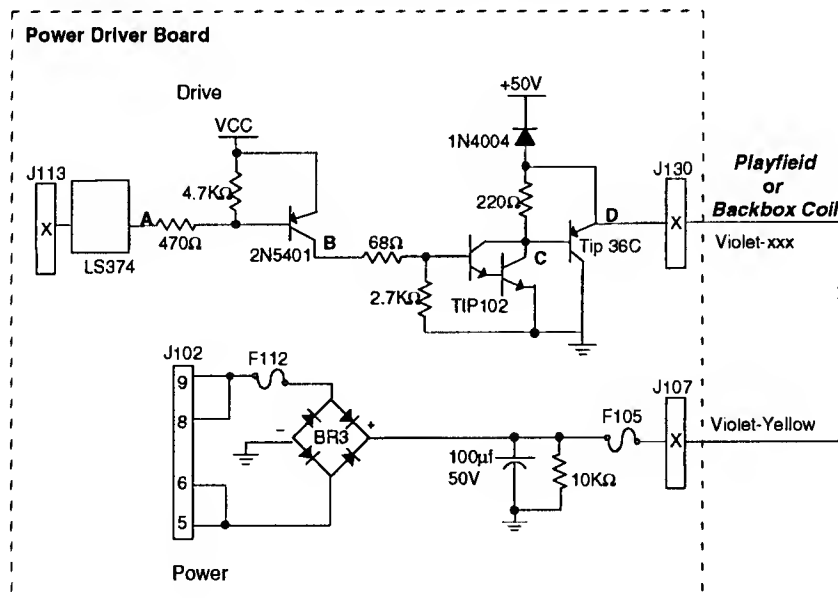
When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type and Voltage Connector		Driver Transistor, Connection, and Wire Color				Solenoid Part Number Flashlamp Type
01	Trap Door	High Power	J107-3	Q82	J130-1		Vio-Brn	AE-26-1500
02	Shooter	High Power	J107-2	Q80	J130-2		Vio-Red	AE-26-1200
03	Qpito Popper	High Power	J107-3	Q78	J130-4		Vio-Grn	AE-23-800
04	Mini Left Qpito Eject	High Power	J107-2	Q76	J130-5		Vio-Yel	AE-26-1500
05	Mini Right Qpito Eject	High Power	J107-2	Q64	J130-6		Vio-Grn	AE-26-1500
06	2nd Chance Logo, Flesher	High Power	J107-5	Q66	J130-7	J131-3	Vio-Blu	#906
07	Knocker	High Power	J107-3	Q68	J130-8		Vio-Blk	AE-23-800
08	Doctor 3	High Power	J107-5	Q70		J131-5	Vio-Gry	#906
09	Left Sling	Low Power	J107-2	Q58	J127-1		Brn-Blk	AE-26-1500
10	Right Sling	Low Power	J107-2	Q56	J127-3		Brn-Red	AE-26-1500
11	Left Jet	Low Power	J107-2	Q54	J127-4		Brn-Grn	AE-26-1200
12	Right Jet	Low Power	J107-2	Q52	J127-5		Brn-Yel	AE-26-1200
13	Bottom Jet	Low Power	J107-2	Q50	J127-6		Brn-Grn	AE-26-1200
14	Backbox Head, Flesher	Low Power	J107-6	Q48		J128-2	Brn-Blu	#906
15	Outhole	Low Power	J107-2	Q46	J127-8		Brn-Vio	AE-27-1200
16	Trough	Low Power	J107-2	Q44	J127-9		Brn-Gry	AE-26-1200
17	Mini-playfield/Doctor 7, Flasher	Flasher	J107-5,6	Q42	J126-1	J125-1	Blk-Brn	#906
18	5 x 3 Left/Left, Flasher	Flesher	J107-5	Q40	J126-2	J125-2	Blk-Red	#906
19	5 x 3 Right/Right, Flasher	Flasher	J107-5	Q38	J126-3	J125-3	Blk-Grn	#906
20	Jet Bumpers/Doctor 5, Flesher	Flasher	J107-5,6	Q36	J126-4	J125-5	Blk-Yel	#906
21	REPAIR/Doctor 4, Flesher	Flasher	J107-5,6	Q28	J126-5	J125-6	Blu-Grn	#906
22	W-(H)-Q/Doctor 2, Flasher	Flesher	J107-5	Q30	J126-6	J125-7	Blu-Blk	#906
23	W-H-(Q)/Doctor 6, Flasher	Low Power	J107-5	Q34	J126-7	J125-8	Blu-Vio	#906
24	ESCAPE/Doctor 1, Flesher	Low Power	J107-5	Q32	J126-8	J125-9	Blu-Gry	#89
25	Not Used	Flesher		Q26			Blu-Brn	
26	Not Used	Flesher		Q24			Blu-Red	
27	Mini-playfield C.C.W./C.W.	Flasher	J107-6	Q22	J122-3		Blu-Grn	A-15680
28	Mini-playfield Qn/Qff	Flasher	J107-6	Q20	J122-4		Blu-Yel	A-15680
	G. I. Circuits							
01	Insert 1	G.I.		Q18	J121-1		Brown	#555
02	Insert 2	G.I.		Q10	J121-2		Orange	#555
03	Playfield A/Insert A	G.I.		Q14	J120-3	J121-3	Yellow	#44, #555
04	Playfield B/Insert B	G.I.		Q16	J120-5	J121-5	Green	#44, #555
05	Playfield C/Insert C	G.I.		Q12	J120-6	J121-6	Violet	#44, #555
	Upper Left Flipper		J907-8,9	Q1, Q5	J902-1, 3		Gry-Yel	FL-15411 (ORG)
	Lower Left Flipper		J907-4,5	Q3, Q9	J902-7, 9		Gry-Yel	FL-15411 (ORG)
	Lower Right Flipper		J907-1,2	Q4, Q11	J902-11,12		Blu-Yel	FL-15411 (ORG)

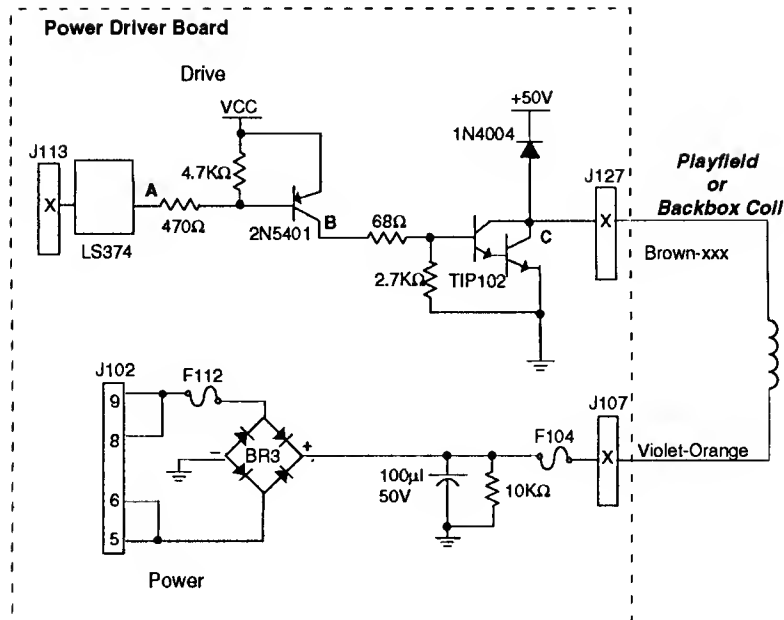
J1XX = Power Driver Board, J9XX = Fliptronic II Board

High Power Solenoid Circuit



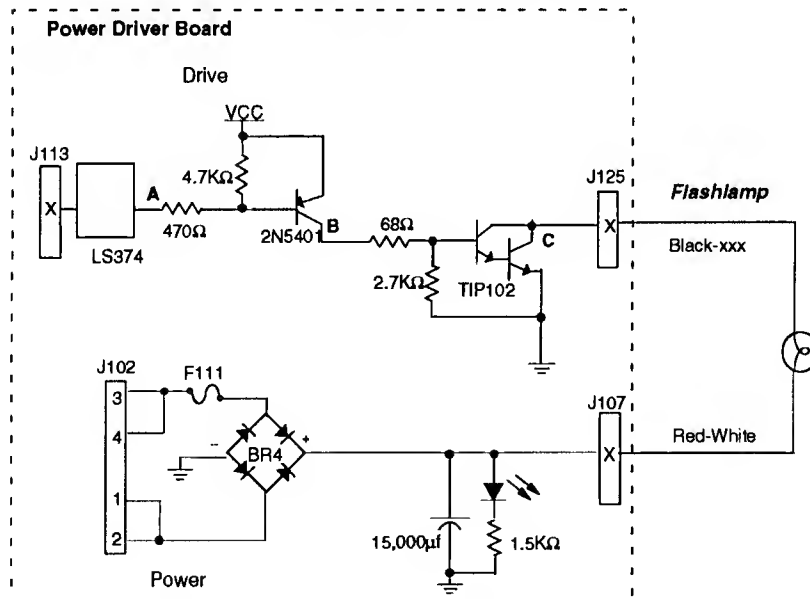
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

Low Power Solenoid Circuit



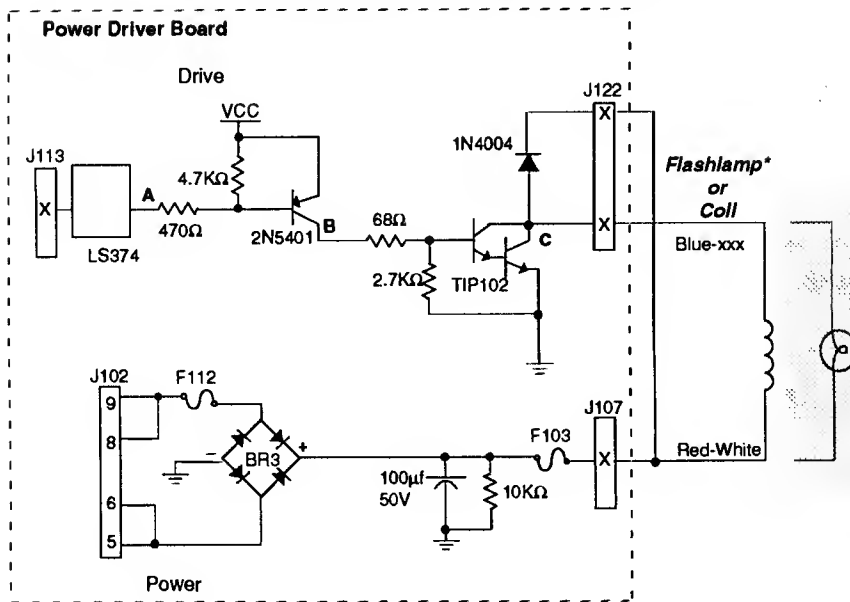
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

Flashlamp Solenoid Circuit



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When Point "C" is low the flashlamp is grounded through the transistor and the flashlamp turns On. When point "A" toggles high the circuit shuts Off.

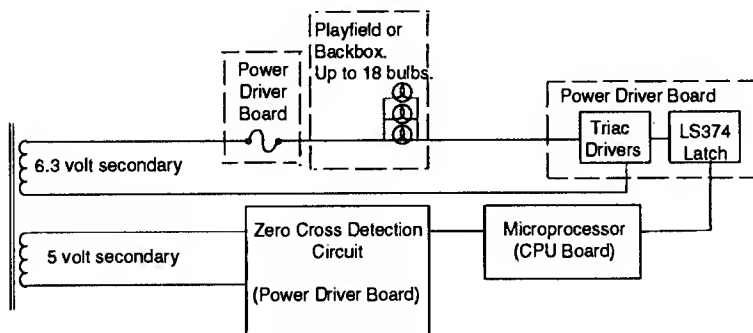
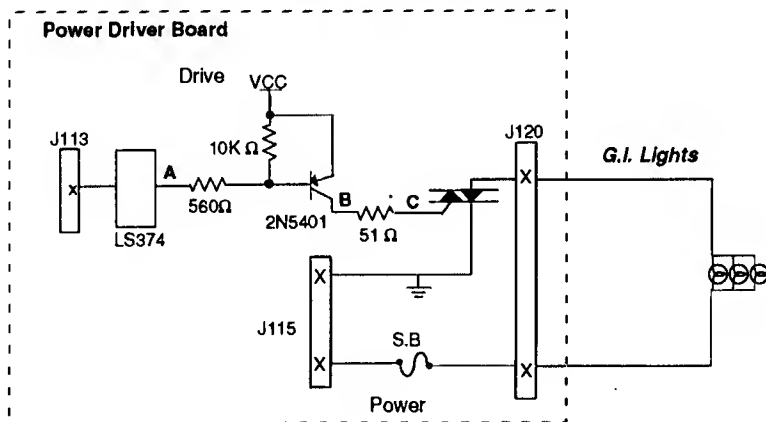
Special (General Purpose) Solenoid Circuit



The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp turns Off.

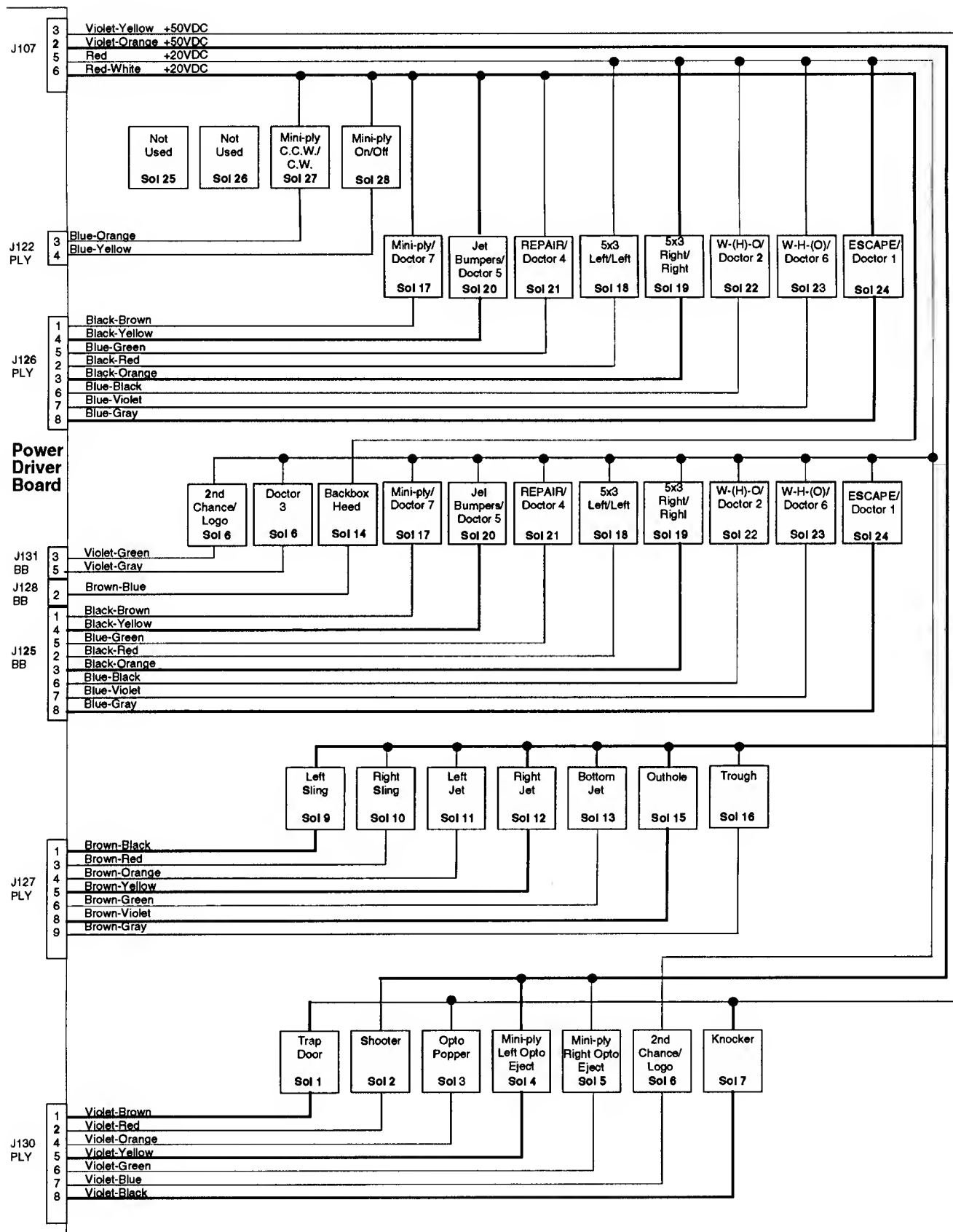
* Tieback Diode Is not used for flashlamp circuit.

General Illumination Circuit



When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired General Illumination string lights.

SOLENOID WIRING



PLY = Playfield
 BB = Backbox

Flipper Opto Switch Board A-15894

Left Side Flipper Opto Switch Board

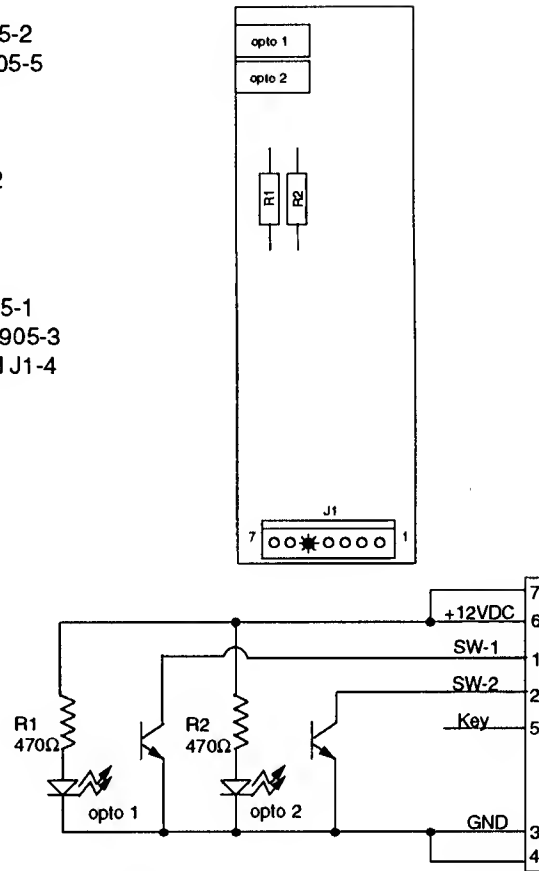
- J1 - 1 Blue-Gray (lower flipper) from Fliptronic II Board J905-2
- J1 - 2 Black-Blue (upper flipper) from Fliptronic II Board J905-5
- J1 - 3 Orange (Switch Grd) from Fliptronic II Board J905-6
- J1 - 4 Orange (Switch Grd) loop from J1-3
- J1 - 5 Key
- J1 - 6 Gray-Yellow (+12V) from Power Driver Board J116-2
- J1 - 7 Gray-Yellow (+12V) loop from J1-6

Right Side Flipper Opto Switch Board

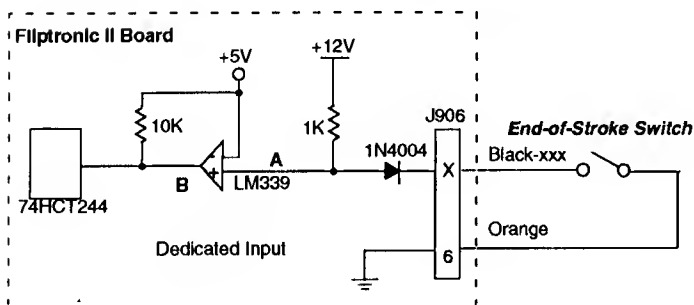
- J1 - 1 Blue-Violet (lower flipper) from Fliptronic II Board J905-1
- J1 - 2 Black-Yellow (upper flipper) from Fliptronic II Board J905-3
- J1 - 3 Orange ((Switch Grd) loop from Left Side Opto Board J1-4
- J1 - 4 N/C
- J1 - 5 Key
- J1 - 6 Gray-Yellow (+12V) from Power Driver Board J116-2
- J1 - 7 Gray-Yellow (+12V) loop from J1-6

Please Note:

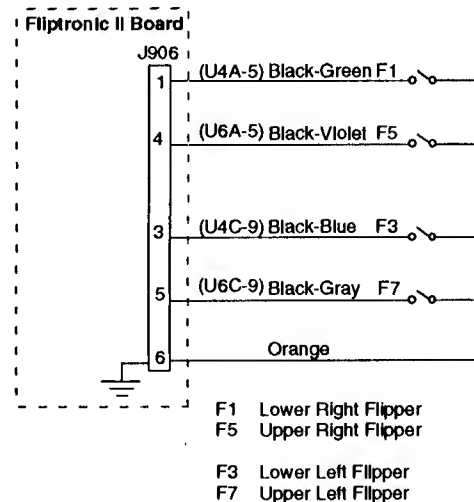
The Left Flipper Opto Switch Board must be connected in order for the Right Flipper Opto Switch Board to operate because power and ground are connected through the printed circuit board.



FLIPTRONIC II FLIPPER END-OF-STROKE SWITCHES



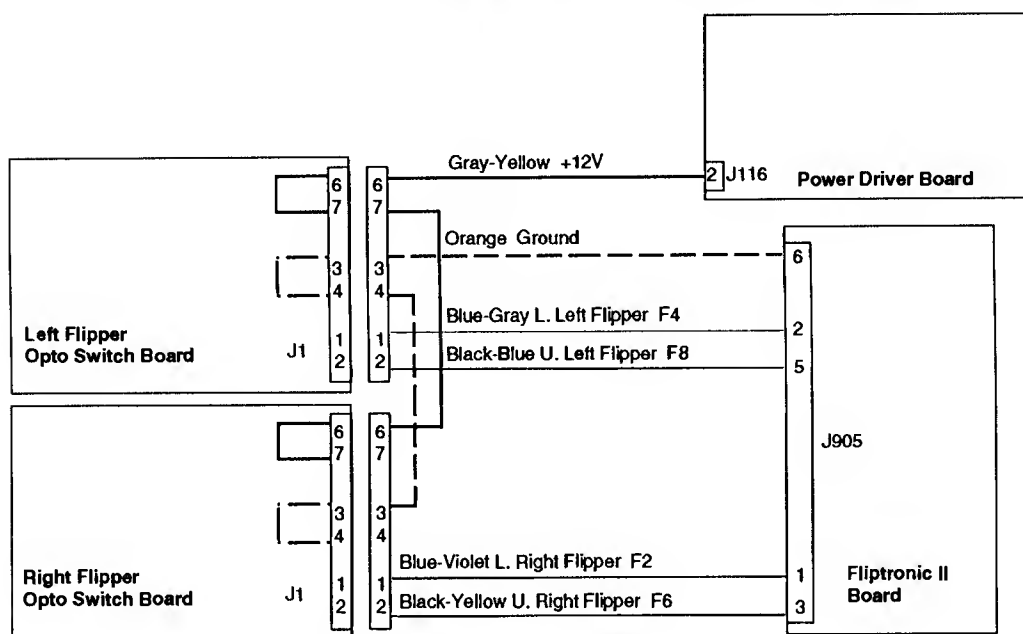
Switch	A	B	
Open	H	H	Off
Closed	L	L	On



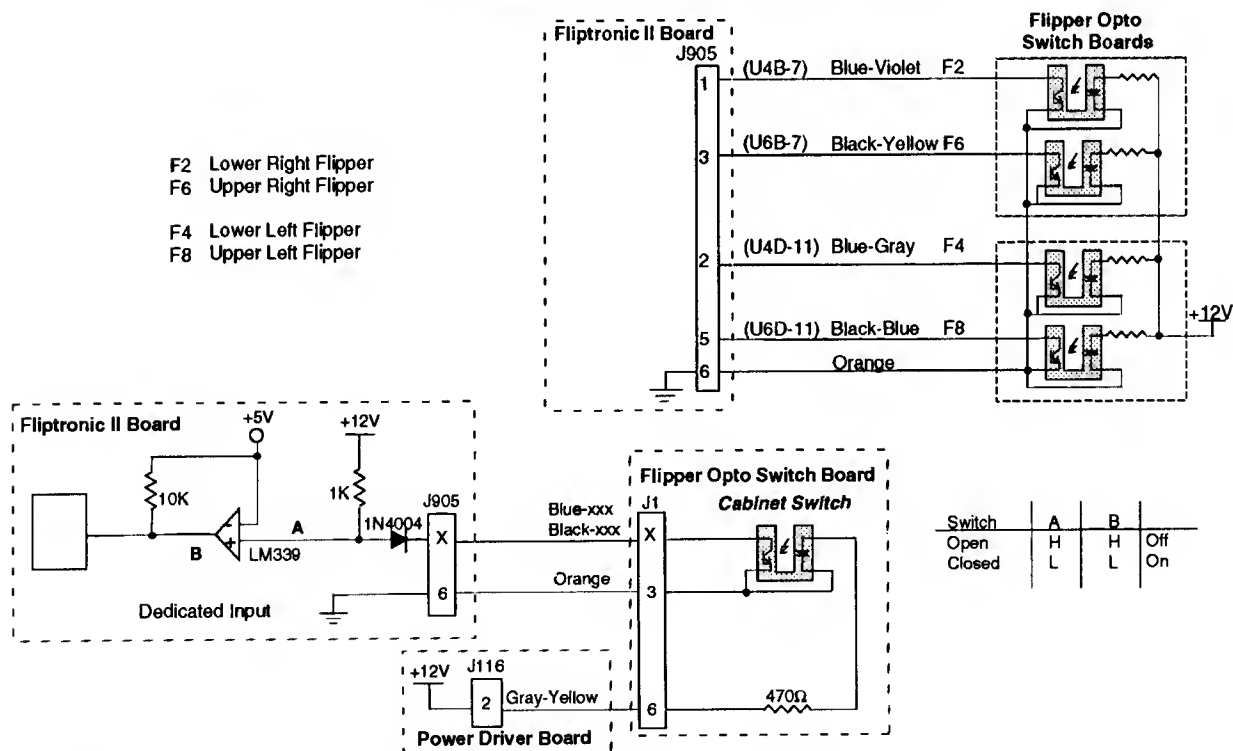
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.

FLIPTRONIC II FLIPPER CABINET SWITCH CIRCUIT DIAGRAM



FLIPTRONIC II FLIPPER CABINET SWITCHES

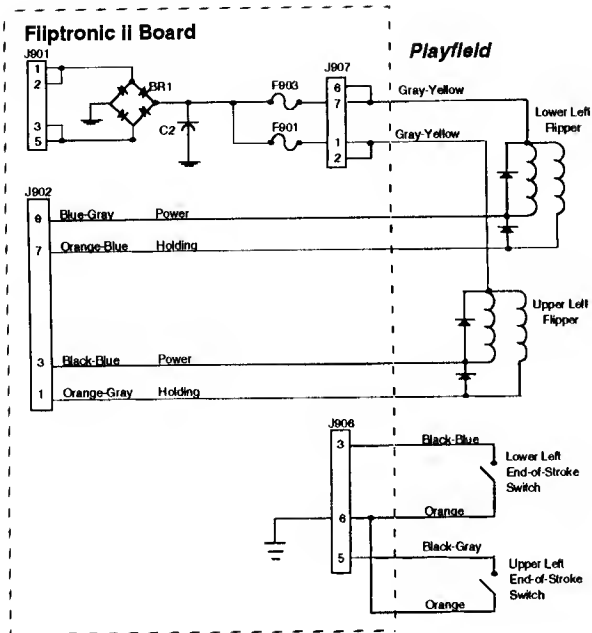


The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

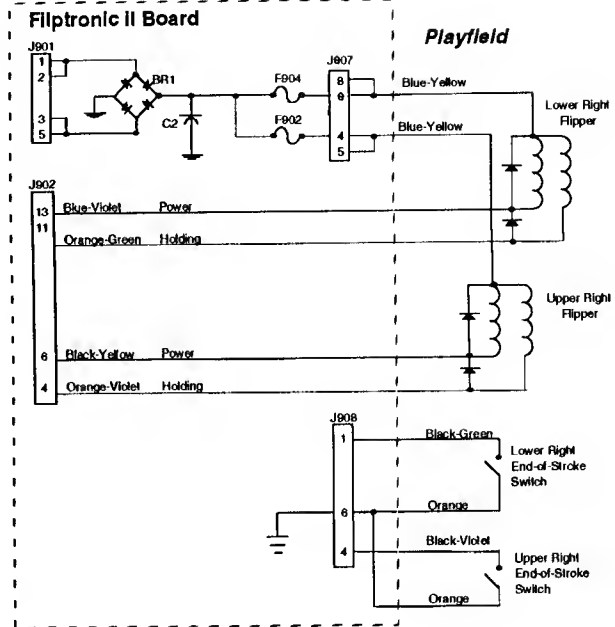
When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.

FLIPTRONIC II FLIPPER CIRCUITS

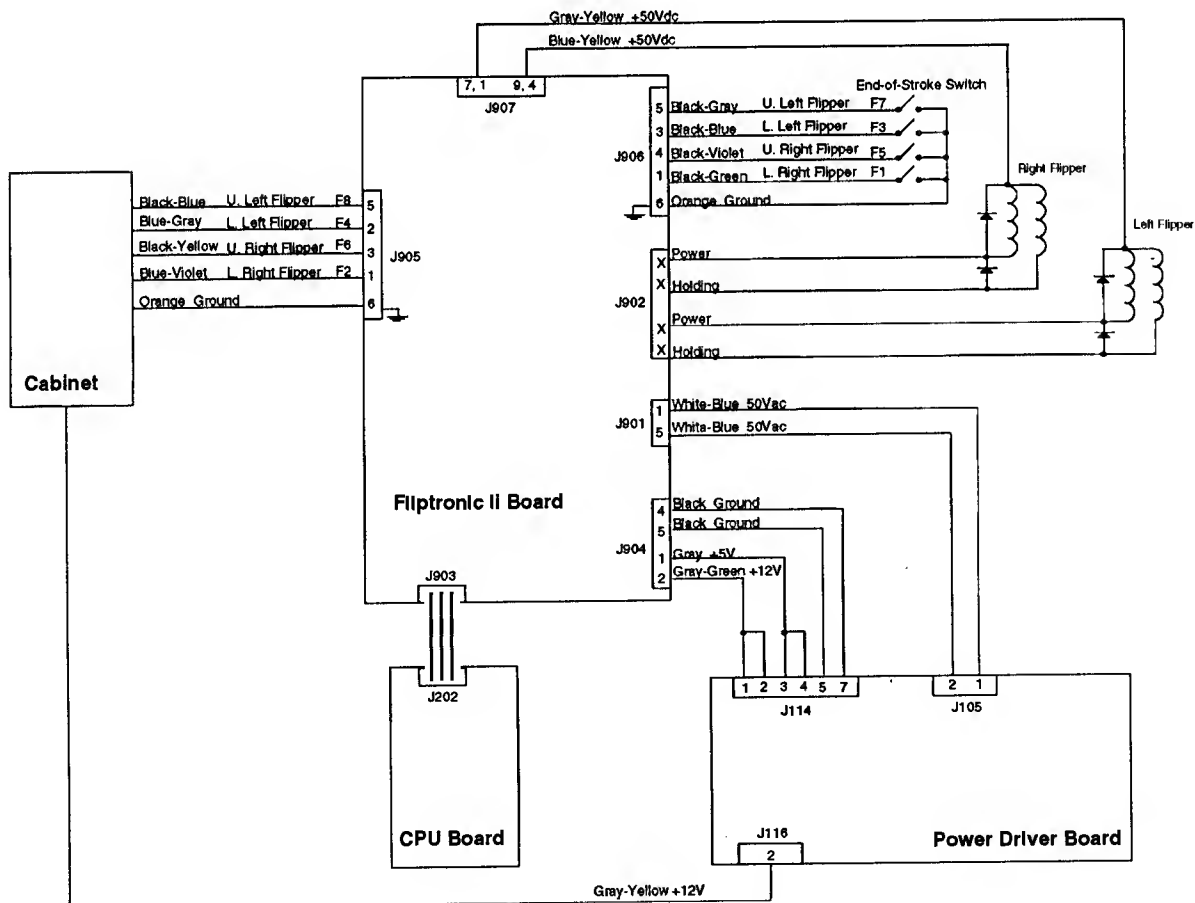
Left Flipper Circuit



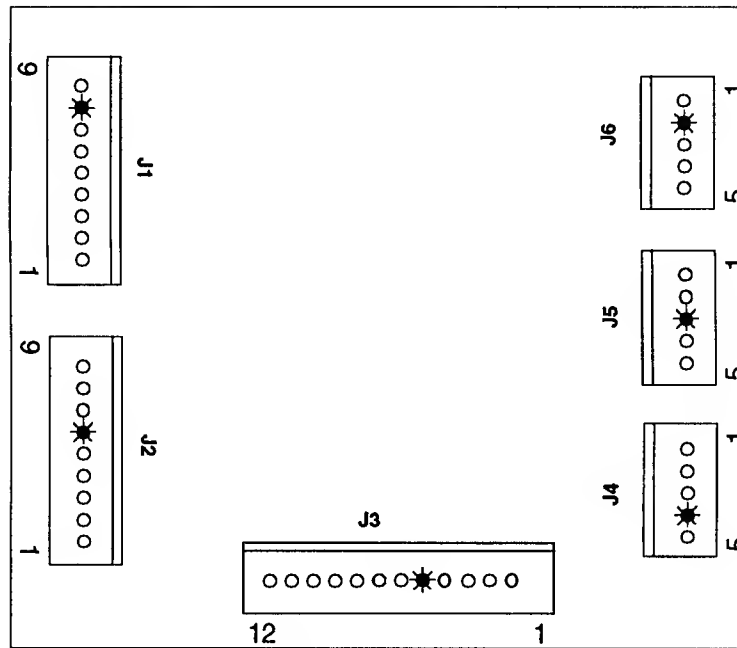
Right Flipper Circuit



FLIPTRONIC II FLIPPER CIRCUIT DIAGRAM



Opto Switch 10 PCB Assembly A-15430



J1-1 Gray-Violet, to opto transmitter Sw #77
 J1-2 Gray-Blue, to opto transmitter Sw #76
 J1-3 Gray-Green, to opto transmitter Sw #71
 J1-4 Gray-Yellow, to opto transmitter Sw #72
 J1-5 Gray-Orange, to opto transmitter Sw #73
 J1-6 Gray-Red, to opto transmitter Sw #74
 J1-7 Gray-Brown, to opto transmitter Sw #75
 J1-8 Key
 J1-9 Black, Ground

J2-1 Orange-Violet, to opto receiver Sw #77
 J2-2 Orange-Blue, to opto receiver Sw #76
 J2-3 Orange-Green, to opto receiver Sw #71
 J2-4 Orange-Yellow, to opto receiver Sw #72
 J2-5 Orange-Black, to opto receiver Sw #73
 J2-6 Key
 J2-7 Orange-Red, to opto receiver Sw #74
 J2-8 Orange-Brown, to opto receiver Sw #75
 J2-9 Gray, +12VDC

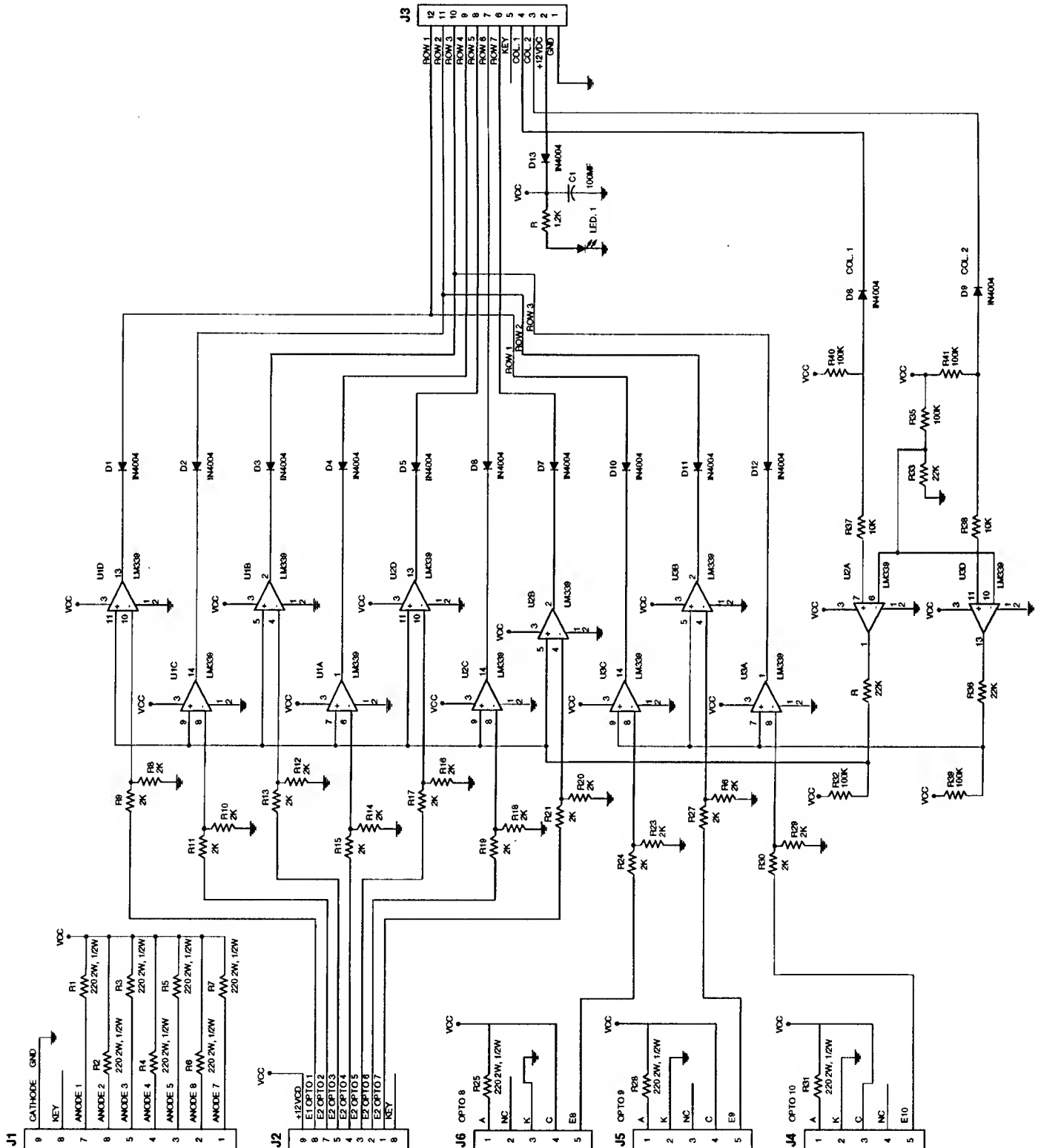
J3-1 Black, Ground
 J3-2 Gray-Yellow, +12VDC from J118-2
 J3-3 Green-Orange, from J206-3, to playfield switches
 J3-4 Green-Violet, from J206-7, to playfield switches
 J3-5 Key
 J3-6 White-Violet, from J208-8, to playfield switches
 J3-7 White-Blue, from J208-7, to playfield switches
 J3-8 White-Green, from J208-5, to playfield switches
 J3-9 White-Yellow, from J208-4, to playfield switches
 J3-10 White-Orange, from J208-3, to playfield switches
 J3-11 White-Red, from J208-2, to playfield switches
 J3-12 White-Brown, from J208-1, to playfield switches

J4-1 Gray, to opto transmitter Sw #33
 J4-2 Key
 J4-3 Black, to opto transmitter Sw #33
 J4-4 White, to opto receiver Sw #33
 J4-5 Green, to opto receiver Sw #33

J5-1 Gray-Yellow, to opto transmitter Sw #32
 J5-2 Black, to opto transmitter Sw #32
 J5-3 Key
 J5-4 White, to opto receiver Sw #32
 J5-5 Green, to opto receiver Sw #32

J6-1 Gray, to opto transmitter Sw #31
 J6-2 Black, to opto transmitter Sw #31
 J6-3 White, to opto receiver Sw #31
 J6-4 Key
 J6-5 Green, to opto receiver Sw #31

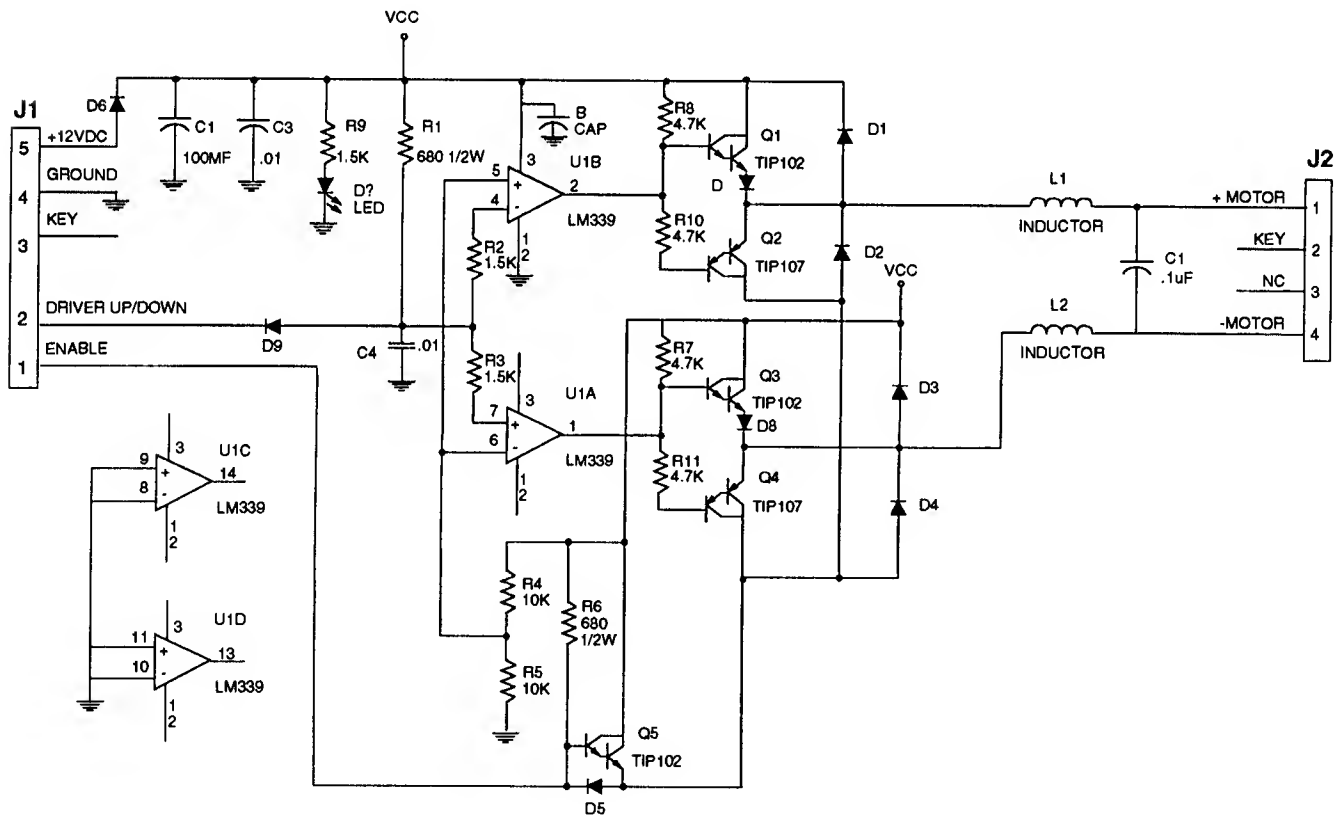
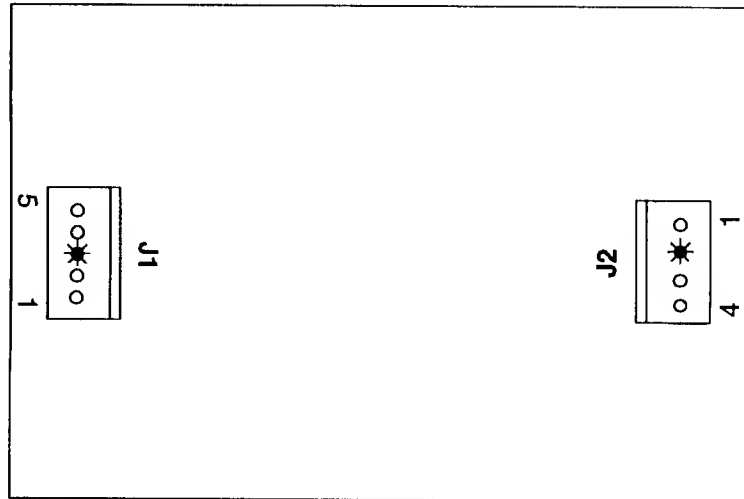
Opto Sw10 PCB Schematic



Bi-directional Motor Drive Assembly A-15680

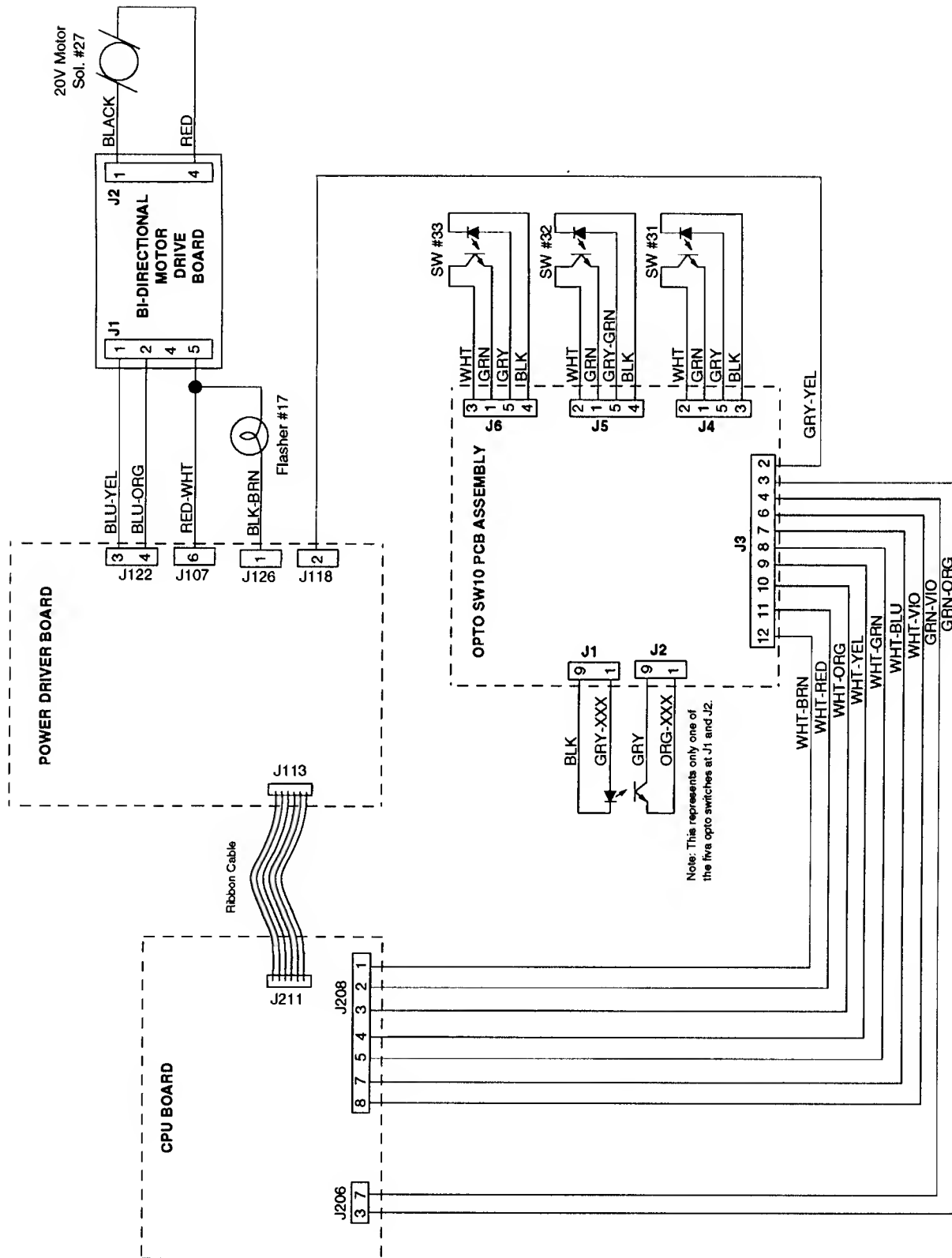
J1-1 Blue-Yellow, from J122-3
J1-2 Blue-Orange, from J122-4
J1-3 Key
J1-4 Black, Ground
J1-5 Red-White, +20VDC from J107-6

J2-1 Black, Ground
J2-2 Key
J2-3 Not Used
J2-4 Red, to cannon motor, Sol 27



Schematic

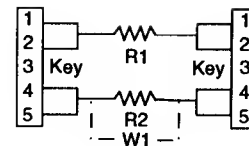
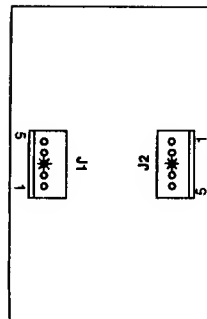
Mini-playfield Wiring Block Diagram



*2-10W Res PCB Assembly A-15309-1

J1-1 White-Orange, to backbox lamps J1-1 (4 Lamp G.I. Assy.)
 J1-2 Not Used
 J1-3 Key
 J1-4 Not Used
 J1-5 Orange, Ground to backbox lamps J1-3 (4 Lamp G.I. Assy.)

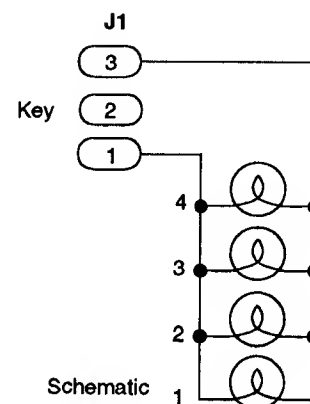
J2-1 White-Orange, from J121-8
 J2-2 Not Used
 J2-3 Key
 J2-4 Black, Ground from J118-3
 J2-5 Not Used



Schematic

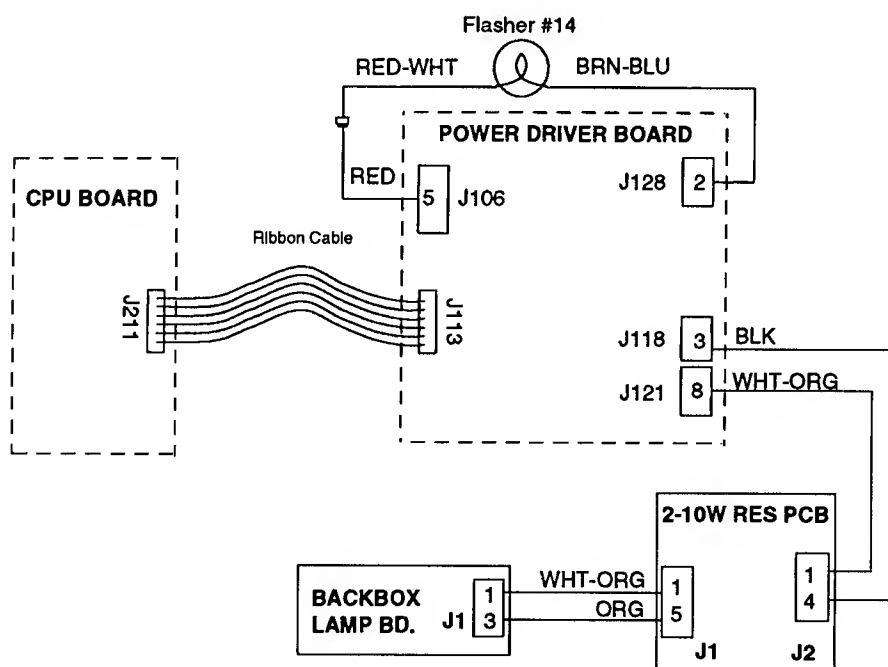
4 Lamp G.I. Assembly A-15742

J1-1 White-Orange, from 2-10W Res PCB J1-1
 J1-2 Key
 J1-3 Orange, Ground from 2-10W Res PCB J1-5

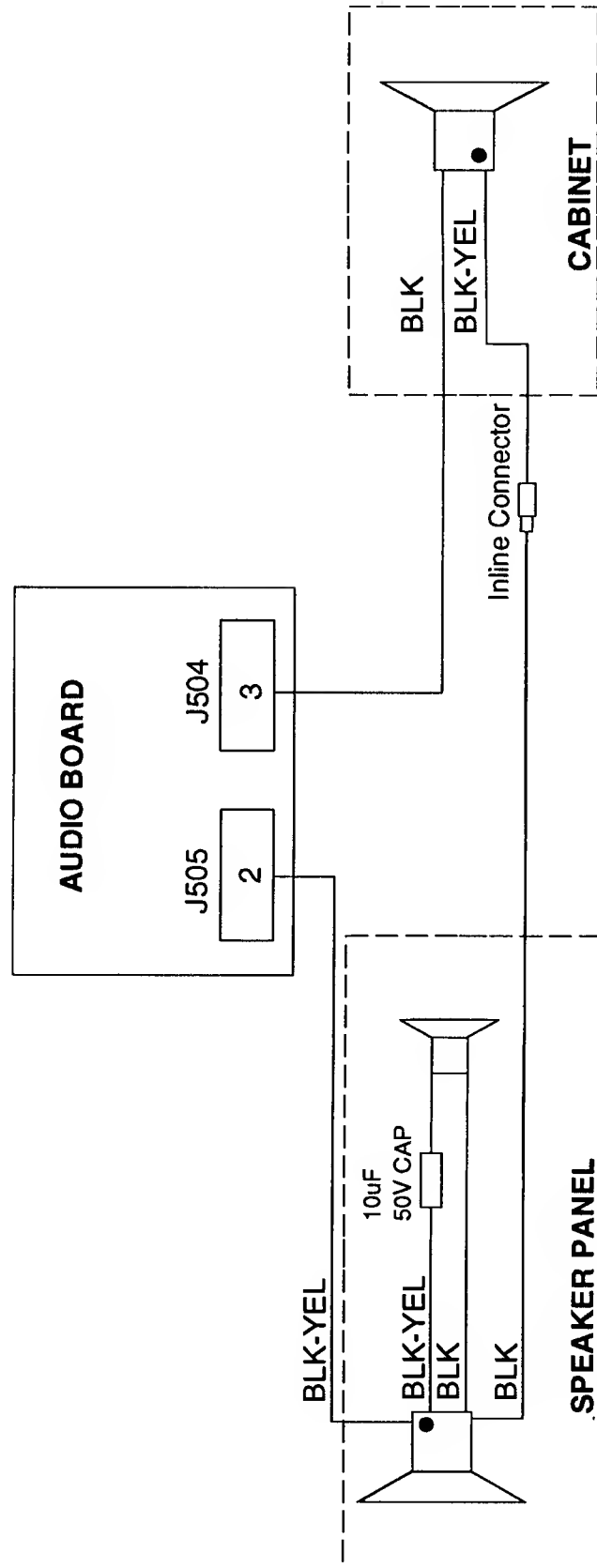


Schematic

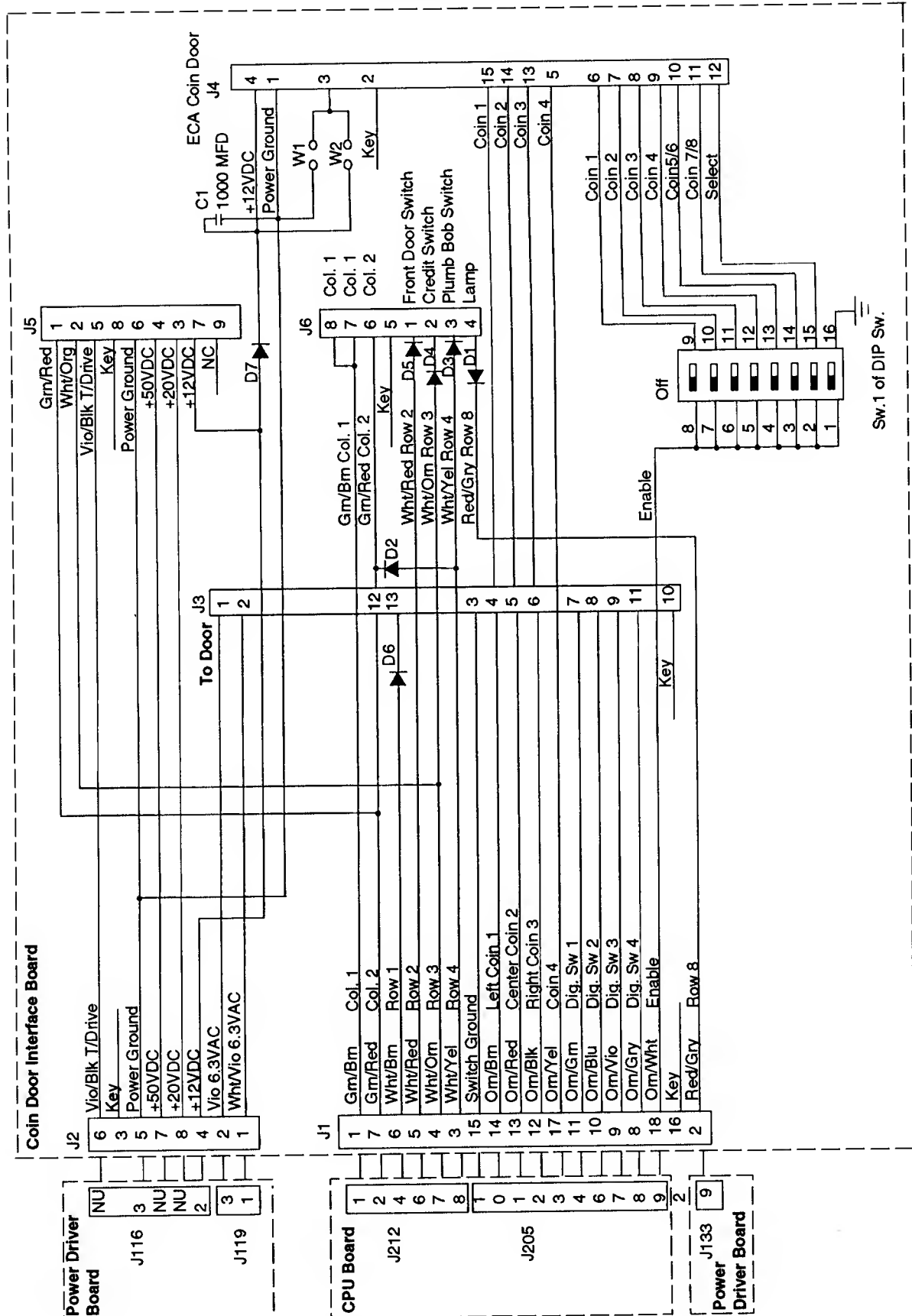
DALEK WIRING BLOCK DIAGRAM



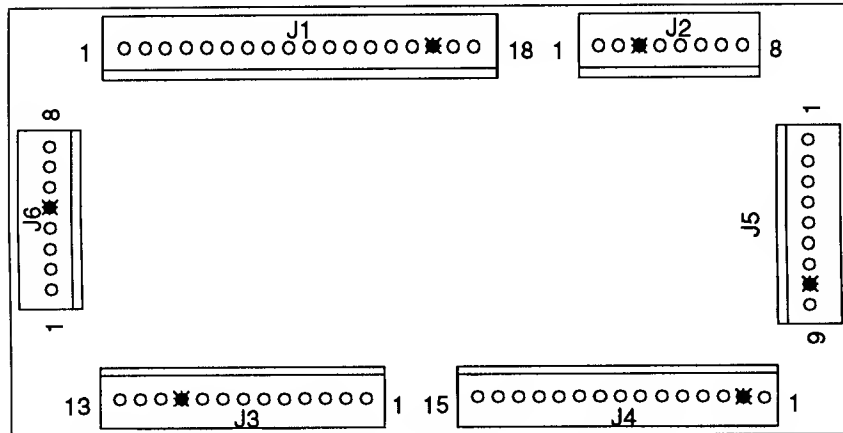
SPEAKER WIRING DIAGRAM



Coin Door Interface Board Schematic A-14689



COIN DOOR INTERFACE BOARD A-14689



J1-1 Green-Brown, switch column 1 from J212-1
 J1-2 Red-Gray, lamp row 8 from J134-9
 J1-3 White-Yellow, switch row 4 from J212-8
 J1-4 White-Orange, switch row 3 from J212-7
 J1-5 White-Red, switch row 2 from J212-6
 J1-6 White-Brown, switch row 1 from J212-4
 J1-7 Green-Red, switch column 2 from J212-2
 J1-8 Orange-Gray, dedicated switch row 8 from J205-9
 J1-9 Orange-Violet, dedicated switch row 7 from J205-8
 J1-10 Orange-Blue, dedicated switch row 6 from J205-7
 J1-11 Orange-Green, dedicated switch row 5 from J205-6
 J1-12 Orange-Black, dedicated switch row 3 from J205-3
 J1-13 Orange-Red, dedicated switch row 2 from J205-2
 J1-14 Orange-Brown, dedicated switch row 1 from J205-1
 J1-15 Black, Ground from J205-10
 J1-16 Key
 J1-17 Orange-Yellow, dedicated switch row 4 from J205-4
 J1-18 Orange-White, switch enable from J205-12

J2-1 Violet, G.I. return from J119-3
 J2-2 White-Violet, G.I. 6.8VAC from J119-1
 J2-3 Key
 J2-4 Gray-Yellow, +12V from J116-2
 J2-5 Black, Ground from J116-3
 J2-6 Not Used
 J2-7 Not Used
 J2-8 Not Used

J3-1 Violet, G.I. return to coin door
 J3-2 White-Violet, G.I. 6.8VAC to coin door
 J3-3 Black, Ground to coin door
 J3-4 Orange-Brown, dedicated switch row 1 to coin door
 J3-5 Not Used
 J3-6 Orange-Black, dedicated switch row 3 to coin door
 J3-7 Orange-Green, dedicated switch row 4 to coin door
 J3-8 Orange-Blue, dedicated switch row 6 to coin door
 J3-9 Orange-Violet, dedicated switch row 7 to coin door
 J3-10 Key
 J3-11 Orange-Gray, dedicated switch row 8 to coin door
 J3-12 Green-Red, switch column 8 to coin door
 J3-13 White-Brown, switch row 1 to coin door

J4 Not Used

J5 Not Used

J6-1 White-Red, switch row 2 to cabinet
 J6-2 White-Orange, switch row 3 to cabinet
 J6-3 White-Yellow, switch row 4 to cabinet
 J6-4 Red-Gray, lamp row 8 to cabinet
 J6-5 Key
 J6-6 Green-Red, switch column 2 to cabinet
 J6-7 Green-Brown, switch column 1 to cabinet
 J6-8 Green-Brown, switch column 1 to cabinet

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

POWER DRIVER BOARD A-12697-1

J101-1 Red, 9VAC from transformer secondary
 J101-2 Red, 9VAC from transformer secondary
 J101-3 Key
 J101-4 Blue-White, 13VAC from transformer secondary
 J101-5 Blue-White, loop from J101-4
 J101-6 Blue-White, 13VAC from transformer secondary
 J101-7 Blue-White, loop from J101-6

J102-1 White-Red, loop from J102-2
 J102-2 White-Red, 16VAC from transformer secondary
 J102-3 White-Red, loop from J102-4
 J102-4 White-Red, 16VAC from transformer secondary
 J102-5 Black-Yellow, loop from J102-6
 J102-6 Black-Yellow, 16VAC from transformer secondary
 J102-7 Key
 J102-8 Black-Yellow, loop from J102-9
 J102-9 Black-Yellow, 16VAC from transformer secondary

J103 Not Used

J104-1 White-Blue, 50VAC to J901-1
 J104-2 White-Blue, 50VAC to J901-3
 J104-3 Key
 J104-4 Not Used
 J104-5 Not Used

J105 Not Used

J106-1 Not Used
 J106-2 Not Used
 J106-3 Not Used
 J106-4 Key
 J106-5 Red, +20V to insert flashlamps

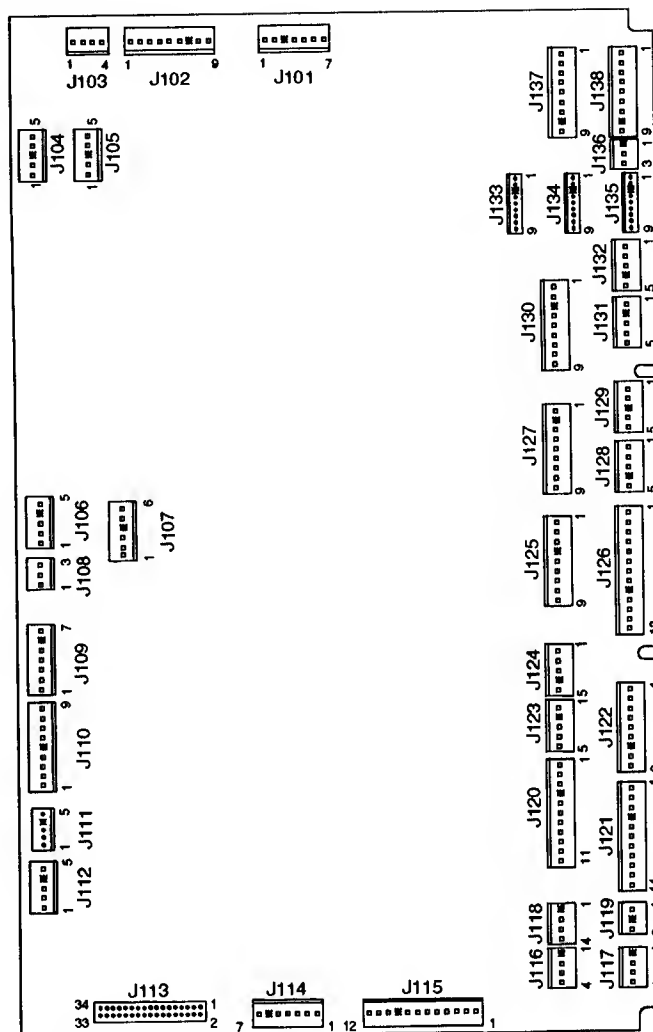
J107-1 Not Used
 J107-2 Violet-Orange, 50V to coils
 J107-3 Violet-Yellow, 50V to coils
 J107-4 Key
 J107-5 Red, +20V to flashlamps
 J107-6 Red-White, +20V to flashlamps

J108 Not Used

J109 Not Used

J110 Not Used

J111 Not Used



J112-1 White-Green, 9.8VAC from transformer secondary
 J112-2 White-Green, loop from J112-1
 J112-3 White-Green, 9.8VAC from transformer secondary
 J112-4 Key
 J112-5 White-Green, loop from J112-3

J113 Ribbon Cable, Data to/from J211

J114-1 Gray/Green, +12VDC to J210-7
 J114-2 Gray/Green, +12VDC to J210-6; J904-2
 J114-3 Gray, +5VDC to J210-5; J502-3
 J114-4 Gray, +5VDC to J210-4; J502-1; J904-1
 J114-5 Black, Ground to J210-3; J502-5; J904-5
 J114-6 Key
 J114-7 Black, Ground to J210-1; J502-4; J904-4

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

POWER DRIVER BOARD CONTINUED...

J115-1 Yellow-White, 6.8VAC from transformer secondary
 J115-2 White-Brown, 6.8VAC from transformer secondary
 J115-3 White-Brown, loop from J115-2
 J115-4 White-Orange, 6.8VAC from transformer secondary
 J115-5 White-Yellow, loop from J115-6
 J115-6 White-Yellow, 6.8VAC from transformer secondary
 J115-7 Orange, 6.8VAC from transformer secondary
 J115-8 Orange, 6.8VAC loop from J115-7
 J115-9 Key
 J115-10 Green, 6.8VAC from transformer secondary
 J115-11 Brown, 6.8VAC from transformer secondary
 J115-12 Brown, 6.8VAC loop from J115-11

J116-1 Key
 J116-2 Gray-Yellow, +12VDC to coin door; J2-4
 J116-3 Black, Ground to coin door; J2-5
 J116-4 Not Used

J117-1 Key
 J117-2 Gray-Yellow, +12VDC to J606-7
 J117-3 Black, Ground to J606-3
 J117-4 Gray, +5VDC to J606-5

J118-1
 J118-2 Gray-Yellow, +12VDC to backbox
 J118-3 Black, Ground
 J118-4

J119-1 White-Violet, 6.8VAC G.I. to coin door; J2-2
 J119-2 Key
 J119-3 Violet, Return G.I. to coin door; J2-1

J120-1 Not Used
 J120-2 Not Used
 J120-3 Yellow, Return G.I. to playfield
 J120-4 Key
 J120-5 Green, Return G.I. to playfield
 J120-6 Violet, Return G.I. to playfield
 J120-7 Not Used
 J120-8 Not Used
 J120-9 White-Yellow, 6.8VAC to playfield
 J120-10 White-Green, 6.8VAC to playfield
 J120-11 White-Violet, 6.8VAC to playfield

J121-1 Brown, Return G.I. to insert
 J121-2 Orange, Return G.I. to insert
 J121-3 Yellow, Return G.I. to insert
 J121-4 Key
 J121-5 Green, Return G.I. to insert
 J121-6 Violet, Return G.I. to insert
 J121-7 White-Brown, 6.8VAC to insert
 J121-8 White-Orange, 6.8VAC to insert
 J121-9 White-Yellow, 6.8VAC to insert
 J121-10 White-Green, 6.8VAC to insert
 J121-11 White-Violet, 6.8VAC to insert

J122-1 Not Used
 J122-2 Not Used
 J122-3 Blue-Orange, Sol 27, Special 7 Drive
 J122-4 Blue-Yellow, Sol 28, Special 8 Drive
 J122-5 Not Used
 J122-6 Not Used
 J122-7 Key
 J122-8 Not Used
 J122-9 Not Used

J123 Not Used

J124-1 Not Used
 J124-2 Not Used
 J124-3 Not Used
 J124-4 Key
 J124-5 Not Used

J125-1 Black-Brown, Sol 17 to insert board flashlamp
 J125-2 Black-Red, Sol 18 to insert board flashlamp
 J125-3 Black-Orange, Sol 19 to insert board flashlamp
 J125-4 Key
 J125-5 Black-Yellow, Sol 20 to insert board flashlamp
 J125-6 Blue-Green, Sol 21 to insert board flashlamp
 J125-7 Blue-Black, Sol 22 to insert board flashlamp
 J125-8 Blue-Violet, Sol 23 to insert board flashlamp
 J125-9 Blue-Gray, Sol 24 to insert board flashlamp

J126-1 Black-Brown, Sol 17 to playfield flashlamp
 J126-2 Black-Red, Sol 18 to playfield flashlamp
 J126-3 Black-Orange, Sol 19 to playfield flashlamp
 J126-4 Black-Yellow, Sol 20 to playfield flashlamp
 J126-5 Blue-Green, Sol 21 to playfield flashlamp
 J126-6 Blue-Black, Sol 22 to playfield flashlamp
 J126-7 Blue-Violet, Sol 23 to playfield flashlamp
 J126-8 Blue-Gray, Sol 24 to playfield flashlamp
 J126-9 Key
 J126-10 Not Used
 J126-11 Not Used
 J126-12 Not Used
 J126-13 Not Used

J127-1 Brown-Black, Sol 9 to playfield coil
 J127-2 Key
 J127-3 Brown-Red, Sol 10 to playfield coil
 J127-4 Brown-Orange, Sol 11 to playfield coil
 J127-5 Brown-Yellow, Sol 12 to playfield coil
 J127-6 Brown-Green, Sol 13 to playfield coil
 J127-7 Not Used
 J127-8 Brown-Violet, Sol 15 to playfield coil
 J127-9 Brown-Gray, Sol 16 to playfield coil

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Filiptronic II Board

POWER DRIVER BOARD CONTINUED...

J128-1 Not Used
 J128-2 Brown-Blue, Sol 14, to backbox
 J128-3 Not Used
 J128-4 Key
 J128-5 Not Used

J129 Not Used

J130-1 Violet-Brown, Sol 1 to playfield coil
 J130-2 Violet-Red, Sol 2 to playfield coil
 J130-3 Key
 J130-4 Violet-Orange, Sol 3 to playfield coil
 J130-5 Violet-Yellow, Sol 4 to playfield coil
 J130-6 Violet-Green, Sol 5 to playfield coil
 J130-7 Violet-Blue, Sol 6 to playfield coil
 J130-8 Violet-Black, Sol 7 to playfield coil
 J130-9 Not Used

J131-1 Not Used
 J131-2 Key
 J131-3 Violet-Blue, to insert flasher
 J131-4 Not Used
 J131-5 Violet-Gray, to insert flasher

J132-1 Not Used
 J132-2 Not Used
 J132-3 Blue-Orange, to insert flasher
 J132-4 Key
 J132-5 Blue-Yellow, to insert flasher

J133-1 Red-Brown, Row 1 to playfield lamps
 J133-2 Red-Black, Row 2 to playfield lamps
 J133-3 Key
 J133-4 Red-Orange, Row 3 to playfield lamps
 J133-5 Red-Yellow, Row 4 to playfield lamps
 J133-6 Red-Green, Row 5 to playfield lamps
 J133-7 Red-Blue, Row 6 to playfield lamps
 J133-8 Red-Violet, Row 7 to playfield lamps
 J133-9 Red-Gray, Row 8 to playfield lamps

J134-1 Not Used
 J134-2 Not Used
 J134-3 Key
 J134-4 Not Used
 J134-5 Not Used
 J134-6 Not Used
 J134-7 Not Used
 J134-8 Not Used
 J134-9 Red-Gray, Row 8 to cabinet lamp

J135-1 Red-Brown, Row 1 to speaker panel lamp
 J135-2 Red-Black, Row 2 to speaker panel lamp
 J135-3 Key
 J135-4 Red-Orange, Row 3 to speaker panel lamp
 J135-5 Not Used
 J135-6 Not Used
 J135-7 Red-Blue, Row 6 to speaker panel lamp
 J135-8 Red-Violet, Row 7 to speaker panel lamp
 J135-9 Red-Gray, Row 8 to speaker panel lamp

J136-1 Key
 J136-2 Not Used
 J136-3 Yellow/Gray, Col 8 to cabinet lamp

J137-1 Yellow-Brown, Col 1 to playfield lamps
 J137-2 Yellow-Red, Col 2 to playfield lamps
 J137-3 Yellow-Orange, Col 3 to playfield lamps
 J137-4 Yellow-Black, Col 4 to playfield lamps
 J137-5 Yellow-Green, Col 5 to playfield lamps
 J137-6 Yellow-Blue, Col 6 to playfield lamps
 J137-7 Yellow-Violet, Col 7 to playfield lamps
 J137-8 Key
 J137-9 Yellow-Gray, Col 8 to playfield lamps

J138-1 Not Used
 J138-2 Yellow-Red, Col 2 to speaker panel lamps
 J138-3 Yellow-Orange, Col 3 to speaker panel lamps
 J138-4 Yellow-Black, Col 4 to speaker panel lamps
 J138-5 Not Used
 J138-6 Yellow-Blue, Col 6 to speaker panel lamps
 J138-7 Yellow-Violet, Col 7 to speaker panel lamps
 J138-8 Key
 J138-9 Yellow-Gray, Col 8 to speaker panel lamps

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

CPU BOARD A-12742-20006

J201 Ribbon Cable, Data to J602

J202 Ribbon Cable, Data to J903; J506; J601

J203 Not Used

J204 Not Used

J205-1 Orange-Brown, Dir Sw 1, Left Coin to J1-14
 J205-2 Orange-Red, Dir Sw 2, Center Coin to J1-13
 J205-3 Orange-Black, Dir Sw 3, Right Coin to J1-12
 J205-4 Orange-Yellow, Dir Sw 4, 4th Coin J1-17
 J205-5 Key
 J205-6 Orange-Green, Dir Sw 5, Escape/Service to J1-11
 J205-7 Orange-Blue, Dir Sw 6, Down/Volume Down to J1-10
 J205-8 Orange-Violet, Dir Sw 7, Up/Volume Up to J1-9
 J205-9 Orange-Gray, Dir Sw 8, Enter/Test to J1-8
 J205-10 Black, Ground to J1-15
 J205-11 Not Used
 J205-12 Orange-White, Enable to J1-18

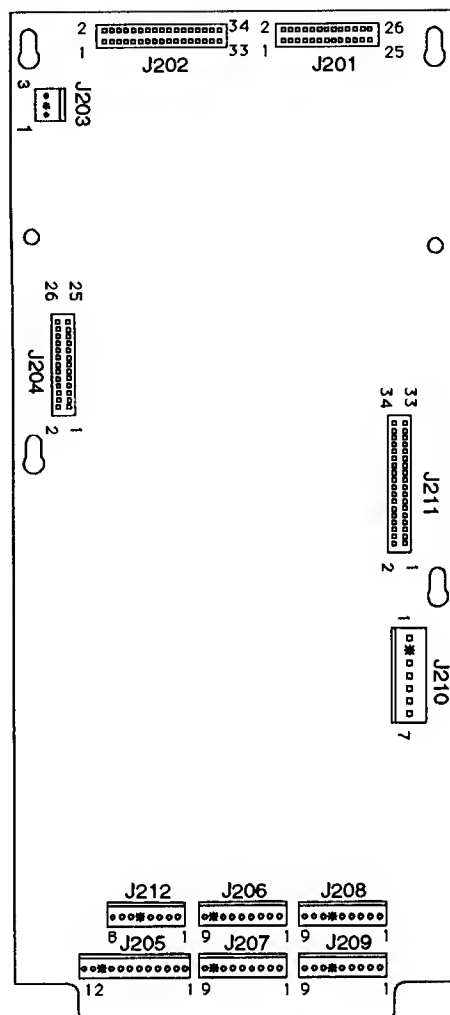
J206-1 Green-Brown, Sw Col 1 to Playfield Switches
 J206-2 Green-Red, Sw Col 2 to Playfield Switches
 J206-3 Green-Orange, Sw Col 3 to Playfield Switches
 J206-4 Green-Yellow, Sw Col 4 to Playfield Switches
 J206-5 Green-Black, Sw Col 5 to Playfield Switches
 J206-6 Green-Blue, Sw Col 6 to Playfield Switches
 J206-7 Green-Violet, Sw Col 7 to Playfield Switches
 J206-8 Key
 J206-9 Green-Gray, Sw Col 8 to Playfield Switches

J207 Not Used

J208-1 White-Brown, Sw Row 1 to Playfield Switches
 J208-2 White-Red, Sw Row 2 to Playfield Switches
 J208-3 White-Orange, Sw Row 3 to Playfield Switches
 J208-4 White-Yellow, Sw Row 4 to Playfield Switches
 J208-5 White-Green, Sw Row 5 to Playfield Switches
 J208-6 Key
 J208-7 White-Blue, Sw Row 6 to Playfield Switches
 J208-8 White-Violet, Sw Row 7 to Playfield Switches
 J208-9 White-Gray, Sw Row 8 to Playfield Switches

J209 Not Used

J210-1 Black, Ground from J114-7
 J210-2 Key
 J210-3 Black, Ground from J114-5
 J210-4 Gray, +5VDC from J114-4
 J210-5 Gray, +5VDC from J114-3
 J210-6 Gray-Green, +12VDC from J114-2
 J210-7 Gray-Green, +12VDC from J114-1



J211 Ribbon Cable, Data from J113

J212-1 Green-Brown, Sw Col 1 to J1-1
 J212-2 Green-Red, Sw Col 2 to J1-7
 J212-3 Green-Orange, Sw Col 3 to J2-3 on 5-Sw. & Diode P.C.
 J212-4 White-Brown, Sw Row 1 to J1-6
 J212-5 Key
 J212-6 White-Red, Sw Row 2 to J1-5
 J212-7 White-Orange, Sw Row 3 to J1-4
 J212-8 White-Yellow, Sw Row 4 to J1-3

P.C. Board Legend

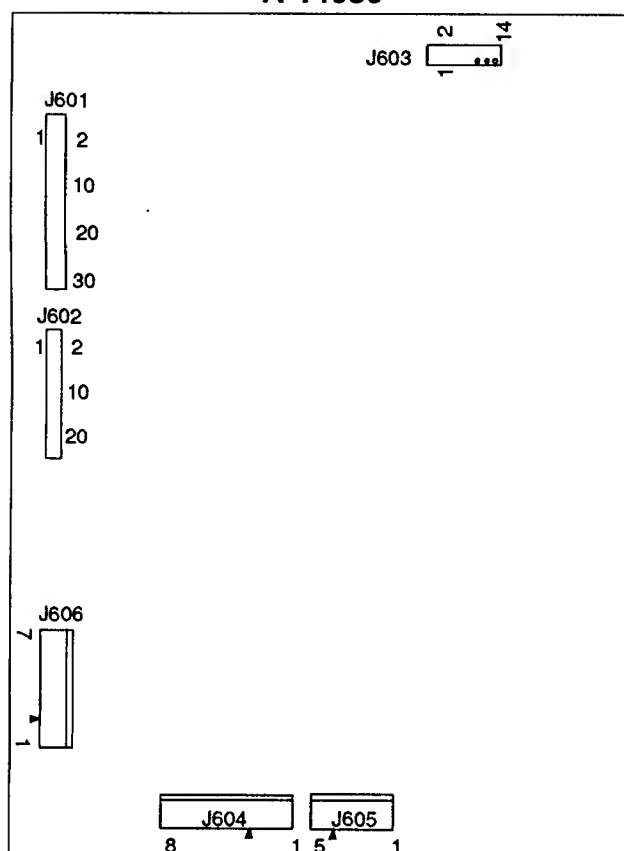
J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Filiptronic II Board

Diagram of the back of a circuit board showing various connectors and their pin counts:

- J506**: A vertical connector with 30 pins, labeled 1, 2, 10, 20, 30.
- J508**: A small rectangular connector with 4 pins, labeled 1, 4.
- J502**: A vertical connector with 5 pins, labeled 1, 3, 5.
- J503**: A small rectangular connector with 4 pins, labeled 1, 4.
- J501**: A horizontal connector with 7 pins, labeled 1, 7.
- J505**: A horizontal connector with 4 pins, labeled 4.
- J504**: A horizontal connector with 4 pins, labeled 1, 4.
- J507**: A small rectangular connector with 4 pins, labeled 1, 4.

DOCTOR WHO 3-24

DOT MATRIX CONTROLLER BOARD A-14039



J601 Ribbon Cable, Data to/from J202; J903; J506

J602 Ribbon Cable, Data from J201

J603 Ribbon Cable, Data to Dot Matrix Display Driver

J604-1 Orange, -125V to Dot Matrix Display Driver Pin 1

J604-2 Blue, -113V to Dot Matrix Display Driver Pin 2

J604-3 Key

J604-4 Black, Ground to Dot Matrix Display Driver Pin 4

J604-5 Black, Ground to Dot Matrix Display Driver Pin 5

J604-6 Gray, +5V to Dot Matrix Display Driver Pin 6

J604-7 Gray-Yellow, +12V to Dot Matrix Display Driver Pin 7

J604-8 Brown, +62 to Dot Matrix Display Driver Pin 8

J605-1 White, 80VAC from transformer secondary

J605-2 White, 80VAC from transformer secondary

J605-3 Violet, 100VAC from transformer secondary

J605-4 Key

J605-5 Violet, 100VAC from transformer secondary

J606-1 Black, Ground loop from J606-3

J606-2 Key

J606-3 Black, Ground from J117-3

J606-4 Gray, +5V loop from J606-5

J606-5 Gray, +5V from J117-4

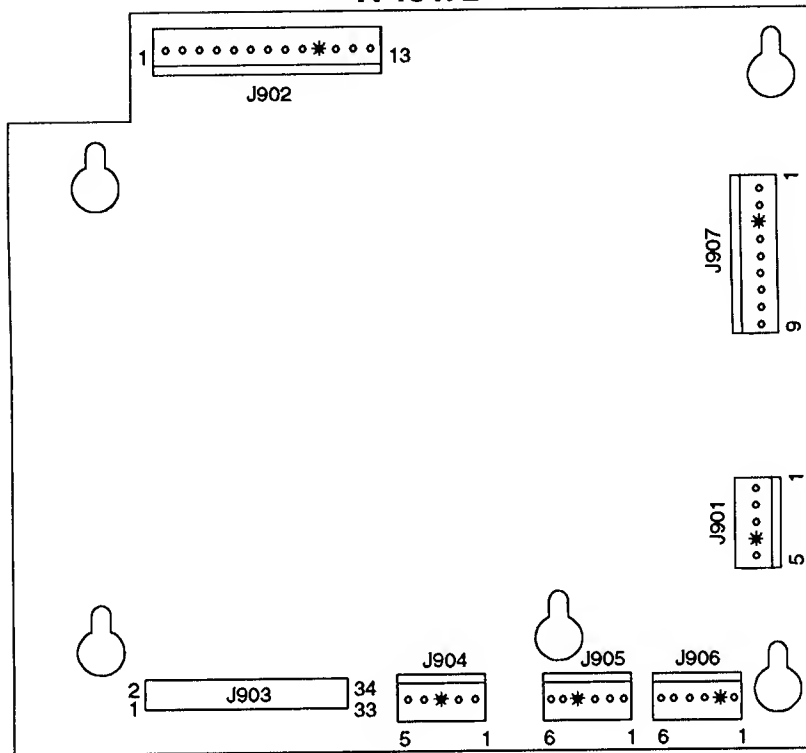
J606-6 Gray-Yellow, +12V loop from J606-7

J606-7 Gray-Yellow, +12V from J117-2

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

FLIPTRONIC II BOARD A-15472



J901-1 White-Blue, 50VAC loop from J105-1
 J901-2 White-Blue, loop from J901-1
 J901-3 White-Blue, 50VAC loop, from J105-2
 J901-4 Key
 J901-5 White-Blue, loop from J901-3

J902-1 Orange-Gray, ?
 J902-2 Not Used
 J902-3 Black-Blue, ?
 J902-4 Not Used
 J902-5 Not Used
 J902-6 Not Used
 J902-7 Orange-Blue, holding to lower left flipper
 J902-8 Not Used
 J902-9 Blue-Gray, power to lower left flipper
 J902-10 Key
 J902-11 Orange-Green, holding to lower right flipper
 J902-12 Not Used
 J902-13 Blue-Violet, power to lower right flipper

J903 Ribbon Cable, data to/from J202; J506; J601

J904-1 Gray, +5V from J114-4
 J904-2 Gray-Green, +12V from J114-2
 J904-3 Key
 J904-4 Black, Ground from J114-7
 J904-5 Black, Ground from J114-5

J905-1 Blue-Violet, to right flipper opto
 J905-2 Blue-Gray, to left flipper opto
 J905-3 Black-Yellow, to right flipper opto
 J905-4 Key
 J905-5 Black-Blue, to left flipper opto
 J905-6 Orange, Switch Ground

J906-1 Black-Green, to lower right end-of-stroke switch
 J906-2 Key
 J906-3 Black-Blue, to lower left end-of-stroke switch
 J906-4 Not Used
 J906-5 Black-Gray, to upper left end-of-stroke switch
 J906-6 Orange, Switch Ground

J907-1 Blue-Yellow, +50V to lower right flipper
 J907-2 Blue-Yellow, loop from J907-1
 J907-3 Key
 J907-4 Gray-Yellow, +50V to lower left flipper
 J907-5 Gray-Yellow, loop from J907-4
 J907-6 Not Used
 J907-7 Not Used
 J907-8 Gray-Yellow, loop from J907-9
 J907-9 Gray-Yellow, +50V to upper left flipper

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Fliptronic II Board

LAMP MATRIX

Column	1	2	3	4	5	6	7	8
Row	Q96 Yel-Brn J137-1	Q97 Yel-Red J137-2	Q98 Yel-Org J137-3	Q95 Yel-Blk J137-4	Q94 Yel-Grn J137-5	Q93 Yel-Blu J137-6	Q92 Yel-Vio J137-7	Q91 Yel-Gry J137-9
1	Q90 Red-Brn J133-1 (E)-S-C-A-P-E 11	Right Return 21	5 x 3, Top Left 1 31	5 x 3, Middle Left 1 41	5 x 3, Bottom Left 1 51	(R)-E-P-A-I-R 61	Doctor 4 (2 lamps) 71	(W)-H-O 81
2	Q89 Red-Blk J133-2 E-(S)-C-A-P-E 12	Right Drain 22	5 x 3, Top Left 2 32	5 x 3, Middle Left 2 42	5 x 3, Bottom Left 2 52	R-(E)-P-A-I-R 62	Doctor 6 (2 lamps) 72	Doctor 3 (2 lamps) 82
3	Q88 Red-Org J133-4 E-S-(C)-A-P-E 13	Doctor 7 (2 lamps) 23	5 x 3, Top Middle 33	5 x 3, Middle Middle 43	5 x 3, Bottom Middle 53	R-E-(P)-A-I-R 63	1.5X 73	W-H-O 1,000,000 83
4	Q87 Red-Yel J133-5 E-S-C-(A)-P-E 14	ESCAPE Special 24	5 x 3, Top Right 2 34	5 x 3, Middle Right 2 44	5 x 3, Bottom Right 2 54	R-E-P-(A)-I-R 64	2X 74	W-H-O 2,000,000 84
5	Q86 Red-Grn J133-6 E-S-C-A-(P)-E 15	ESCAPE 3,000,000 25	5 x 3, Top Right 1 35	5 x 3, Middle Right 1 45	5 x 3, Bottom Right 1 55	R-E-P-A-(I)-R 65	2.5X 75	W-H-O Lite Extra Ball 85
6	Q85 Red-Blu J133-7 E-S-C-A-P-(E) 16	ESCAPE 2,000,000 26	Doctor 2 (2 lamps) 36	Transmat Award 46	Mini-ply Left Lock 56	R-E-P-A-I-(R) 66	3X 76	Ball Transmat & Advance Bonus X 86
7	Q84 Red-Vio J133-6 Left Drain 17	ESCAPE 1,000,000 27	Hangon Score 37	Tardis 47	Mini-ply Right Lock 57	Doctor 5 (2 lamps) 67	3.5X 77	Launch Ball 87
8	Q83 Red-Gry J133-9 Left Return 18	ESCAPE 500,000 28	Video Mode 38	Doctor 1 (2 lamps) 48	Mini-ply Target 58	Shoot Again 68	4X 78	Game Start 88

SWITCH MATRIX

Dedicated Switches

Column	1	2	3	4	5	6	7	8
Row	U17-5 Org-Brn J205-1 Left Coin Chute D1	U17-7 Org-Red J205-2 Center Coin Chute D2	U17-11 Org-Blk J205-3 Right Coin Chute D3	U17-9 Org-Yel J205-4 4th Coin Chute D4	U16-9 Org-Grn J205-6 Normal Function Service Credits D5	U16-11 Org-Blu J205-7 Normal Function Volume Down D6	U16-7 Org-Vio J205-8 Normal Function Volume Up D7	U16-5 Org-Gry J205-9 Normal Function Begin Test D8

Column	1	2	3	4	5	6	7	8
Row	U20-16 Grn-Brn J206-1	U20-17 Grn-Red J206-2	U20-16 Grn-Org J206-3	U20-15 Grn-Yel J206-4	U20-14 Grn-Blk J206-5	U20-13 Grn-Blu J206-6	U20-12 Grn-Vio J206-7	U20-11 Grn-Gry J206-9
1	U16-11 Wht-Brn J206-1 Not Used 11	Slam Tilt 21	Opto Popper 31	(E)-S-C-A-P-E 41	(R)-E-P-A-I-R 51	Left Jet 61	Mini Opto 5 Bank Right 1 71	Not Used 81
2	U16-9 Wht-Red J206-2 Not Used 12	Coin Door Closed 22	Mini-ply Home Opto 32	(E)-S-C-A-P-E 42	(R)-E-P-A-I-R 52	Right Jet 62	Mini Opto 5 Bank Right 2 72	Playfield Glass 82
3	U18-5 Wht-Org J206-3 Start Button 13	Ticket Opto. 23	Enter Top Ramp Opto 33	E-S-(C)-A-P-E 43	R-E-(P)-A-I-R 53	Bottom Jet 63	Mini Opto 5 Bank Middle 73	Not Used 83
4	U16-7 Wht-Yel J206-4 Plumb Bob Tilt 14	Always Closed 24	Launch Ball 34	E-S-C-(A)-P-E 44	R-E-P-(A)-I-R 54	Left Drain 64	Mini Opto 5 Bank Left 2 74	Not Used 84
5	U19-11 Wht-Grn J206-5 Left Sling 15	Trough 1 Ball 25	Score Top Ramp 35	E-S-C-A-(P)-E 45	R-E-P-A-(I)-R 55	Left Return 65	Mini Opto 5 Bank Left 1 75	Not Used 85
6	U19-9 Wht-Blu J206-7 Right Sling 16	Trough 2 Balls 26	Enter Bottom Ramp 36	E-S-C-A-P-(E) 46	R-E-P-A-I-(R) 56	Right Return 66	Mini-ply Left Opto Eject 76	Not Used 86
7	U19-5 Wht-Vio J206-8 Shooter Lane 17	Trough 3 Balls 27	Score Bottom Ramp 37	Hang On Score 47	Trap Door Down 57	Right Drain 67	Mini-ply Right Opto Eject 77	Not Used 87
8	U19-7 Wht-Gry J206-9 Exit Jets 18	Outhole 28	Mini-ply Door, Middle 38	Select Doctor 48	Transmat Award 58	Mini-ply Door, Left 68	Mini-ply Lites Lock 78	Mini-ply Door, Right 88

Flipper Switches

U4A-5 Blk-Grn J906-1 Right Flipper End of Stroke F1	U4B-7 Blu-Vio J905-1 Right Flipper Opto F2	U4C-9 Blk-Blu J906-3 Left Flipper End of Stroke F3	U4D-11 Blu-Gry J905-2 Left Flipper Opto F4	U6A-5 Blk-Vio J906-4 Upper Right Flipper End of Stroke F5	U6B-7 Blk-Yel J905-3 Upper Right Flipper Opto F6	U6C-9 Blk-Gry J906-5 Upper Left Flipper End of Stroke F7	U6D-11 Blk-Blu J905-5 Upper Left Flipper Opto F8
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J1XX = Power Driver Board, J2XX = CPU Board, J9XX = Fliptron II Board

WARNINGS & NOTICES

WARNING

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